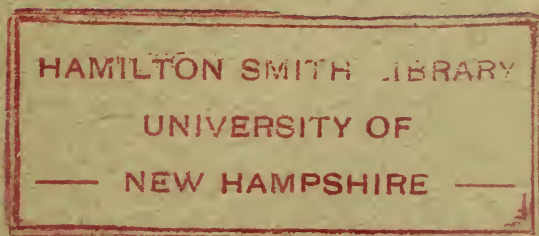


378.742
N5345
1939/40

BULLETIN OF THE
UNIVERSITY OF NEW HAMPSHIRE

Graduate School Number



Vol. XXX, No. 8

APRIL, 1939

Durham

BULLETIN OF THE UNIVERSITY OF NEW HAMPSHIRE

Entered as second-class matter, August 5, 1907, at the post office at Durham, N. H., under the Act of Congress of July 16, 1894.

The Bulletin is published in September, October, November, December, January, February, March, and April, and includes:

The Catalog of the University

The Report of the President

The Financial Report

The Catalog of the Summer School

The Pictorial Folder

The Catalog of the Graduate School

and other publications of the University.

UNIVERSITY CALENDAR

1939-40

SUMMER SESSION

1939

| | | |
|---------|---------|----------------------------------|
| June 26 | Monday | Registration Day |
| June 27 | Tuesday | Classes begin at 7:30 A. M. |
| Aug. 4 | Friday | Summer Session closes at 4 P. M. |

FIRST SEMESTER

1939

| | | |
|----------|-----------|--|
| Sept. 19 | Tuesday | Matriculation Day—Freshman Class |
| Sept. 25 | Monday | Registration Day—Upper Classes |
| Sept. 26 | Tuesday | Recitations begin at 8 A. M. |
| Sept. 28 | Thursday | University Day—Afternoon holiday |
| Oct. 4 | Wednesday | Meeting of University Senate at 4:15 P. M. |
| Oct. 20 | Friday | Annual Meeting of Board of Trustees |
| Oct. 28 | Saturday | Dads' Day |
| Nov. 11 | Saturday | Homecoming Day |
| Nov. 16 | Thursday | Mid-Semester reports to be filed, 5 P. M. |
| Nov. 29 | Wednesday | Thanksgiving Recess—Wed., 12:30 P. M. to Mon., 8 A. M. |
| Dec. 16 | Saturday | Christmas Recess begins at 12:30 P. M. |

1940

| | | |
|--------------------|------------|----------------------------------|
| Jan. 2 | Tuesday | Christmas Recess ends at 8 A. M. |
| Jan. 19 | Friday | Meeting of Board of Trustees |
| Jan. 23- Feb. 2 | Tues.-Fri. | First Semester examinations |

SECOND SEMESTER

| | | |
|--------|---------|------------------------------|
| Feb. 5 | Monday | Registration Day—All Classes |
| Feb. 6 | Tuesday | Recitations begin at 8 A. M. |

UNIVERSITY OF NEW HAMPSHIRE

| | | |
|-----------|-------------|--|
| Feb. 2 | Friday | Winter Carnival, Fri., 12:30 P. M., to Sat., 12:30 P. M. |
| Feb. 14 | Wednesday | Meeting of University Senate at 4:15 P. M. |
| Mar. 30 | Saturday | Spring Recess begins at 12:30 P. M. |
| Apr. 8 | Monday | Spring Recess ends at 8 A. M. |
| Apr. 18 | Thursday | Mid-Semester reports to be filed, 5 P. M. |
| Apr. 19 | Friday | Meeting of Board of Trustees |
| May 18 | Saturday | Mothers' Day |
| May 30 | Thursday | Memorial Day—Holiday |
| June 3-13 | Mon.-Thurs. | Second Semester examinations |
| June 14 | Friday | Meeting of University Senate at 4:15 P. M. |
| June 15 | Saturday | Alumni Day—Meeting of Board of Trustees |
| June 16 | Sunday | Baccalaureate Exercises |
| June 17 | Monday | Class Day Exercises at 10:00 A. M. Commencement at 2:00 P. M. |

SUMMER SESSION

1940

| | | |
|--------|---------|----------------------------------|
| July 1 | Monday | Registration Day |
| July 2 | Tuesday | Classes begin at 7:30 A. M. |
| Aug. 9 | Friday | Summer Session closes at 4 P. M. |

BOARD OF TRUSTEES

HIS EXCELLENCY, GOVERNOR FRANCIS P. MURPHY, A.M., LL.D., *ex officio*

PRESIDENT FRED ENGELHARDT, A.M., PH.D., *ex officio*

ANDREW L. FELKER, Commissioner of Agriculture, *ex officio*

ROY D. HUNTER, LL.D., *President* West Claremont
June 14, 1916 to June 30, 1941

HARRY D. SAWYER Woodstock
September 15, 1926 to June 30, 1942

JAMES A. WELLMAN, B.S. Manchester
January 26, 1928 to June 30, 1939

ROBERT T. KINGSBURY Keene
January 27, 1928 to June 30, 1940

GEORGE T. HUGHES, A.M., LL.D. Dover
July 1, 1931 to June 30, 1940

*JOHN S. ELLIOTT, B.S., *Secretary* Madbury
July 1, 1932 to June 30, 1940

JESSIE DOE Rollinsford
July 1, 1932 to June 30, 1942

JOHN T. DALLAS, A.B., D.D., LL.D. Concord
July 1, 1933 to June 30, 1941

FRANK W. RANDALL, B.S. Portsmouth
July 1, 1936 to June 30, 1940

*HENRY F. JUDKINS, B.S. White Plains, N. Y.
July 1, 1939 to June 30, 1943

* Elected by Alumni.

UNIVERSITY OF NEW HAMPSHIRE

OFFICERS OF ADMINISTRATION*

FRED ENGELHARDT, PH.D., *President of the University*
HERMON L. SLOBIN, PH.D., *Dean of the Graduate School*
NORMAN ALEXANDER, PH.D., *Dean of Men*
RUTH J. WOODRUFF, PH.D., *Dean of Women*
EVERETT B. SACKETT, PH.D., *Registrar*
RAYMOND C. MAGRATH, *Treasurer and Business Secretary*
ARWOOD S. NORTHBY, PH.D., *Assistant to the President*
MARVIN A. MILLER, B.A., B.S., *Librarian*

THE EXECUTIVE COMMITTEE

HERMON L. SLOBIN, PH.D., *Dean of the Graduate School*
ORMOND R. BUTLER, PH.D., *Chairman, Division of Biological Sciences*
GEORGE W. CASE, M.C.E., *Chairman, Division of Engineering*
THOMAS G. PHILLIPS, PH.D., *Chairman, Division of Physical Sciences*
HAROLD H. SCUDDER, B.S., *Chairman, Division of Language and Literature*
A. MONROE STOWE, PH.D., *Chairman, Division of Education*
HARRY C. WOODWORTH, M.S., *Chairman, Division of Social Sciences*

THE GRADUATE FACULTY

ALEXANDER, NORMAN, *Associate Professor of Economics*
B.A., University of North Dakota, 1919; M.A., *ibid.*, 1920;
LL.B., Yale university, 1922; PH.D., Columbia university,
1931.
ATKINSON, EDWARD R., *Assistant Professor of Chemistry*
B.S., Massachusetts Institute of Technology, 1933; PH.D.,
ibid., 1936.
BABCOCK, DONALD C., *Professor of History*
B.A., University of Minnesota, 1907; M.A., *ibid.*, 1908; S.T.B.,
Boston university, 1912.
BACHELDER, JOSEPH E., JR., *Assistant Professor of Sociology*
B.A., Westminster college, 1933; PH.D., Yale university, 1937.
BAUER, GEORGE N., *Professor of Statistics in the Department of Mathematics*
B.S., University of Minnesota, 1894; M.S., University of
Iowa, 1898; PH.D., Columbia university, 1900; Goettingen,
Germany, 1907-1908.

* As of May 1, 1939.

GRADUATE SCHOOL

- BINGHAM, SYLVESTER H., *Assistant Professor of English*
A.B., Dartmouth college, 1922; A.M., Harvard university, 1929; PH.D., Yale university, 1937.
- BISBEE, HARLAN M., *Associate Professor of Education*
A.B., Bowdoin college, 1898; A.M., Harvard university, 1905.
- BOTTORFF, CHARLES A., JR., *Assistant Professor of Poultry Husbandry*
B.S. in Bacteriology, B.S. in Veterinary Medicine, and D.V.M., Washington State college, 1928.
- BOWLER, EDMOND W., *Professor of Civil Engineering*
S.B., in Sanitary Engineering, Massachusetts Institute of Technology, 1914.
- BUFFINGTON, ALBERT F., *Assistant Professor of Languages*
A.B., Bucknell university, 1928; A.M., Harvard university, 1932; PH.D., *ibid.*, 1937.
- BUTLER, ORMOND R., *Professor of Botany*
B.S., M.S., University of California, 1905; PH.D., Cornell university, 1910; Diploma, Institut Nationale Agricole, Lausanne, 1895.
- CALKIN, JOHN W., *Assistant Professor of Mathematics*
B.A., St. Stephen's college, Columbia university, 1933; M.A., Harvard university, 1934; PH.D., *ibid.*, 1937.
- CASE, GEORGE W., *Professor of Mechanical Engineering*
B.S. in C.E., Purdue university, 1905; M.C.E., Cornell university, 1912.
- CHAPMAN, DONALD H., *Assistant Professor of Geology*
B.A., University of Michigan, 1927; M.A., *ibid.*, 1928; PH.D., *ibid.*, 1931.
- CHARLES, T. BURR, *Professor of Poultry Husbandry*
B.S., Cornell university, 1915; M.S., *ibid.*, 1938.
- CONKLIN, JAMES G., *Assistant Professor of Entomology*
B.S., Connecticut Agricultural college, 1926; M.S., University of New Hampshire, 1929; graduate study, Ohio State university, 1929-31 and 1939.
- COULTER, CHARLES W., *Professor of Sociology*
B.A., University of Toronto, 1908; B.D., Victoria college, 1909; M.A., Yale university, 1910; PH.D., *ibid.*, 1914.
- COVER, MORRIS S., *Instructor in Poultry Husbandry*
V.M.D., University of Pennsylvania, 1938.
- DAGGETT, ALBERT F., *Assistant Professor of Chemistry*
B.S., University of New Hampshire, 1928; M.S., *ibid.*, 1930; PH.D., Columbia university, 1934.
- DEGLER, CARROLL M., *Assistant Professor of Economics*
A.B., University of Kansas, 1925; M.B.A., New York university, 1927.

UNIVERSITY OF NEW HAMPSHIRE

- DEMOS, MILTIADES S., *Assistant Professor of Mathematics*
B.S., Robert college, Constantinople, Turkey, 1922; PH.D., Harvard university, 1926; Sheldon Traveling fellow of Harvard university, Munich, Germany, 1926-27.
- DONOVAN, EDWARD T., *Assistant Professor of Mechanical Engineering*
B.S., University of Wisconsin, 1921.
- DUNN, STUART, *Assistant Professor of Botany*
B.S., University of Minnesota, 1923; M.S., Iowa State college, 1925; PH.D., University of Minnesota, 1931.
- EADIE, WILLIAM R., *Instructor in Zoölogy*
B.S., University of New Hampshire, 1932; M.S., *ibid.*, 1933; graduate study, Cornell university, 1938-39.
- EVANS, F. GAYNOR, *Instructor in Zoölogy*
B.A., Coe college, 1931; M.A., Columbia university, 1932; PH.D., *ibid.*, 1937.
- FOGG, LLOYD C., *Associate Professor of Zoölogy*
B.S., Dartmouth college, 1922; M.S., *ibid.*, 1924; PH.D., Columbia university, 1930.
- FUNKHOUSER, JAMES A., *Associate Professor of Chemistry*
B.S., Carnegie Institute of Technology, 1925; PH.D., Ohio State university, 1930.
- GLOVER, LEON C., *Assistant Professor of Entomology*
B.S., University of New Hampshire, 1923; M.S., *ibid.*, 1928; PH.D., Iowa State college, 1936.
- GRIGAUT, PAUL L., *Assistant Professor of Languages*
B. ès L., 1926, Certifié de Licence (Sorbonne); Diplôme de l'Ecole du Louvre, 1932.
- GRINNELL, HAROLD C., *Assistant Professor of Agricultural Economics*
B.S., Cornell university, 1921; M.S., *ibid.*, 1930.
- HARTMANN, GREGORY K., *Assistant Professor of Physics*
B.S., California Institute of Technology, 1933; B.A., Queen's college, Oxford university, 1936; PH.D., Brown university, 1939.
- HARVEY, LASHLEY G., *Assistant Professor of Government*
A.B., William Jewell college, 1925; A.M., Leland Stanford, Jr., university, 1930; graduate study, Harvard university, 1936-38.
- HENNESSY, WILLIAM G., *Associate Professor of English*
A.B., Boston university, 1916; A.M., *ibid.*, 1924.
- HEPLER, JESSE R., *Associate Professor of Horticulture*
B.S., Pennsylvania State college, 1911; M.S., University of Wisconsin, 1922.

GRADUATE SCHOOL

- HITCHCOCK, LEON W., *Professor of Electrical Engineering*
B.S., Worcester Polytechnic institute, 1908.
- HODGDON, ALBION R., *Instructor in Botany*
B.S., University of New Hampshire, 1930; M.S., *ibid.*, 1932;
PH.D., Harvard university, 1936.
- HOWES, HORACE L., *Professor of Physics*
B.S., Syracuse university, 1905; PH.D., Cornell university,
1915.
- IDDLES, HAROLD A., *Professor of Chemistry*
B.S., Michigan State college, 1918; M.S., University of Iowa,
1921; PH.D., Columbia university, 1925.
- JACKSON, C. FLOYD, *Professor of Zoölogy*
B.A., DePauw university, 1905; M.S., Ohio State university,
1907.
- JOHNSON, GIBSON R., *Assistant Professor of History*
A.B., Muskingum college, 1916; M.A., Princeton university,
1920; PH.D., Edinburgh university, 1922.
- KALIJARVI, THORSTEN V., *Professor of Government*
A.B., Clark university, 1920; A.M., *ibid.*, 1923; PH.D., Univer-
sity of Berlin, 1935.
- LATIMER, L. PHELPS, *Assistant Professor of Horticulture*
B.S., University of California, 1921; M.S., *ibid.*, 1922; PH.D.,
ibid., 1926.
- MACLEOD, ALAN G., *Assistant Professor of Agricultural Eco-
nomics*
B.A., University of Saskatchewan, 1927; M.A., *ibid.*, 1929;
graduate study, Harvard university, 1931-33, 1935.
- MARSTON, PHILIP M., *Assistant Professor of History*
B.A., University of New Hampshire, 1924; M.A., *ibid.*, 1927.
- MARTIN, CARL L., *Assistant Professor of Veterinary Science*
B.S., University of New Hampshire, 1925; D.V.M., Ohio State
university, 1928.
- MASON, CHARLES M., *Associate Professor of Chemistry*
B.S., University of Arizona, 1928; M.S., *ibid.*, 1929; PH.D.,
Yale university, 1932.
- MCGRAIL, THOMAS H., *Assistant Professor of English*
B.A., University of New Hampshire, 1927; M.A., Cornell
university, 1931; PH.D., *ibid.*, 1936.
- MEYERS, THEODORE R., *Assistant Professor of Geology*
B.A., Ohio State university, 1926; M.A., *ibid.*, 1929; Austin
fellow, Harvard university, 1931-32.
- MILLS, MARIAN E., *Assistant Professor of Botany*
B.S., Teachers college, Columbia university, 1917; M.A., *ibid.*,
1920.

UNIVERSITY OF NEW HAMPSHIRE

- MOORE, HERBERT C., *Assistant Professor of Dairy Husbandry*
B.S., Purdue university, 1923; M.S., University of Minnesota, 1925.
- MORROW, KENNETH S., *Professor of Dairy Husbandry*
B.S., University of Minnesota, 1918; M.S., *ibid.*, 1925.
- NULSEN, WILLIAM B., *Assistant Professor of Electrical Engineering*
B.S., California Institute of Technology, 1918; M.S., University of New Hampshire, 1930.
- O'KANE, WALTER C., *Professor of Entomology*
B.A., Ohio State university, 1897; M.A., *ibid.*, 1909; D.Sc. (hon.), *ibid.*, 1932.
- PARKER, CLIFFORD S., *Professor of Languages*
A.B., Harvard university, 1912; A.M., *ibid.*, 1914; PH.D., Columbia university, 1925.
- PHILLIPS, THOMAS G., *Professor of Agricultural and Biological Chemistry*
B.S., Ohio State university, 1912; M.S., *ibid.*, 1913; PH.D., University of Chicago, 1918.
- PRINCE, FORD S., *Professor of Agronomy*
B.S., University of Illinois, 1913; graduate study, Welsh Plant Breeding station, Aberystwyth, Wales, 1938.
- RICHARDS, ALFRED E., *Professor of English*
A.B., Yale university, 1898; A.M., *ibid.*, 1900; PH.D., University of Munich, Germany, 1904.
- RICHARDSON, EDYTHE T., *Assistant Professor of Zoölogy*
B.S., University of New Hampshire, 1922; MS., *ibid.*, 1924.
- RITZMAN, ERNEST G., *Research Professor in Animal Husbandry*
B.S.A., Iowa State college, 1903; M.S. (hon.), University of New Hampshire, 1928.
- RUDD, HERBERT F., *Professor of Philosophy*
A.B., Central college, Iowa, 1900; B.D., University of Chicago, 1903; M.A., *ibid.*, 1913; PH.D., *ibid.*, 1914.
- SACKETT, EVERETT B., *Associate Professor of Education*
B.A., Hamline university, 1923; M.A., University of Minnesota, 1925; PH.D., Columbia university, 1931.
- SCHOEDINGER, PAUL S., *Assistant Professor of English*
A.B., Princeton university, 1920; M.A., Ohio State university, 1921.
- SCHOOLCRAFT, JAMES T., JR., *Assistant Professor of Languages*
B.S., Union college, 1923; Abgangs-Zeugnis, Heidelberg university, 1924; A.M., Columbia university, 1926.
- SCUDDER, HAROLD H., *Professor of English*
B.S., Dartmouth college, 1903; study at Cambridge university, England, 1936.

GRADUATE SCHOOL

- SHIMER, STANLEY R., *Assistant Professor of Agricultural and Biological Chemistry*
B.S., Muhlenberg college, 1918; M.S., Pennsylvania State college, 1923; graduate study, Cornell university, 1929-30.
- SKELTON, RUSSELL R., *Associate Professor of Civil Engineering*
B.S. in civil engineering, Purdue university, 1923; C.E., *ibid.*, 1934; graduate study, Harvard university, 1938-39.
- SLANETZ, LAWRENCE W., *Assistant Professor of Bacteriology*
B.S., Connecticut State college, 1929; PH.D., Yale university, 1932.
- SLOBIN, HERMON L., *Professor of Mathematics*
A.B., Clark university, 1905; PH.D., *ibid.*, 1908; study at Cambridge university, England, and in Europe, 1932.
- SMITH, HARRY W., *Professor of Economics*
A.B., Hamilton college, 1908; A.M., *ibid.*, 1912; A.M., Columbia university, 1920; Auburn Theological seminary, 1911; studied under appointment of Carnegie Endowment for International Peace, in Europe, 1926.
- SMITH, WILLIAM W., *Assistant Professor of Horticulture*
B.S., University of New Hampshire, 1924; M.S., *ibid.*, 1929; PH.D., Michigan State college, 1935.
- STOWE, A. MONROE, *Professor of Education*
PH.B., Northwestern university, 1903; A.M., *ibid.*, 1904; A.M., Harvard university, 1905; PH.D., Columbia university, 1909.
- SWONGER, CLAIR W., *Assistant Professor of Economics*
A.B., University of Kansas, 1925; A.M., Harvard university, 1927; graduate study, Harvard university, 1932-33.
- TIRRELL, LORING V., *Professor of Animal Husbandry*
B.S., Massachusetts Agricultural college, 1920.
- TOWLE, CARROLL S., *Associate Professor of English*
A.B., Bowdoin college, 1922; PH.D., Yale university, 1933.
- WALSH, JOHN S., *Associate Professor of Languages*
A.B., Harvard university, 1915; M.A., Boston university, 1928.
- WHITE, GEORGE W., *Professor of Geology*
B.A., Otterbein college, 1921; M.A., Ohio State university, 1925; PH.D., *ibid.*, 1933.
- WOODRUFF, RUTH J., *Associate Professor of Economics*
A.B., Bryn Mawr, 1919; A.M., *ibid.*, 1920; PH.D., Radcliffe, 1931.
- WOODWORTH, HARRY C., *Professor of Agricultural Economics*
B.S., University of Illinois, 1909; M.S., Cornell university, 1916; study under social science research fellowship, Harvard university, 1929-30.
- YEAGER, ALBERT F., *Professor of Horticulture*
B.S., Kansas State college, 1912; M.S., Oregon Agricultural college, 1916; PH.D., Iowa State college, 1936.

THE GRADUATE SCHOOL

RULES AND REGULATIONS

Admission to the Graduate school may be granted to graduates of all colleges and universities of approved standing provided their undergraduate records are satisfactory. Before entering upon graduate work in any division the applicant must present evidence to the effect that he has had the necessary prerequisite training that will enable him to pursue with profit the courses desired. A candidate for admission who intends to work for a master's degree must have had an undergraduate average of not less than 75 throughout his entire program of study. This requirement may be waived in the case of a mature college graduate who gives evidence of adequate professional experience or advanced study since graduation from an undergraduate program, upon petition to the Executive committee. Admission to the Graduate school does not imply admission to candidacy for the degree. A candidate for admission who does not intend to be a candidate for a degree may enroll in the Graduate school for any course for which he has had sufficient preparation. No graduate student is admitted to candidacy for a degree until he has been in residence a sufficient time to enable his instructors to judge of his ability to carry on graduate work. Generally this period of time shall be not less than one semester or two summer sessions. Admission to candidacy for a degree will be determined by the Executive committee.

TUITION AND FEES

Tuition is \$150 for residents of New Hampshire and \$250 for non-residents. Tuition is paid in advance in two equal installments, one on the first day of each semester.

A diploma fee of \$5 is charged upon graduation. Charges

GRADUATE SCHOOL

will be assessed for extraordinary breakage or damage. No laboratory or course fees are charged. Payment of the full tuition fee entitles the student to admission to all varsity athletic games and contests.

Members of the regular university staff and their immediate families electing work in the Graduate school shall be required to pay \$2.60 a credit for eight or less credits.

Members of the university staff who may register in the Summer school are required to pay \$2.60 a credit with the further proviso that the general Summer school registration fee of \$10 for residents of New Hampshire shall not be charged.

Residents of New Hampshire, not members of the university staff or of their immediate families, who elect less than eight credits in the Graduate school will be expected to pay a registration fee of \$1 and a charge of \$5.25 for each credit.

Non-residents of New Hampshire registering in the Graduate school for less than eight credits shall be required to pay a registration fee of \$2 and tuition at the rate of \$10.50 a credit.

HONORARY FELLOWSHIPS FOR VISITING SCHOLARS

Properly qualified scholars who may desire temporarily the privileges of the library and research facilities of the university and who are not candidates for a degree may, upon recommendation of the dean of the Graduate school and the approval of the president of the university, be appointed honorary fellows without stipend. Honorary fellows shall not be required to pay any charges except possibly the cost of unusually expensive supplies or equipment.

ASSISTANTSHIPS AND SCHOLARSHIPS

Graduate assistantships, which usually require half-time service at a stated salary, are available in a number of departments. Graduate assistants pay tuition in accordance with the regulation pertaining to the members of the university staff. The residence requirement for a master's degree for holders of these

UNIVERSITY OF NEW HAMPSHIRE

appointments is not less than two years. Inquiries regarding assistantships should be addressed to the head of the department concerned.

A limited number of superior students who are legal residents of New Hampshire are awarded exemption from tuition. These awards are subject to the maintenance of a high scholarship record in the Graduate school and may be revoked at the end of any semester if the student does not merit such exemption for the subsequent semester. Inquiries regarding scholarships should be addressed to the dean of the Graduate school.

SUPPLIES

Books, drawing instruments and instructional materials may be purchased at the university bookstore in Thompson hall.

ROOMS

Because of the congestion of undergraduate students in the dormitories of the university, it is impossible to guarantee reservation of rooms to graduate students. Rooms may be secured in private houses at prices from \$85 to \$150 a year.

Women students, unless living at home, are required to room in the women's dormitories, or in approved houses. A competent matron is in charge of each women's dormitory.

BOARD

The university operates on a self-service basis a modern, well-appointed commons. Regular weekly board and cafeteria service are provided. Exact cost records are kept, and prices adjusted in such a manner as to give students the advantage of changing costs.

REGISTRATION

A student desiring to register for graduate study must submit to the dean of the Graduate school the official application for admission to graduate study. Blanks for this purpose may be obtained from the dean of the Graduate school.

GRADUATE SCHOOL

ADVANCED DEGREES

The advanced degrees conferred are: Master of science, master of arts, master of education, master of civil engineering, master of electrical engineering, and master of mechanical engineering.

REQUIREMENTS FOR THE MASTER'S DEGREE

RESIDENCE.—A minimum of one full academic year, or four summer sessions of six weeks each, at the University of New Hampshire, or three summer sessions of eight weeks each at the Isles of Shoals, in residence is required.

In the case of a student who offers six semester credits earned in another graduate school, the residence requirement will be reduced to three summer sessions or one semester and one summer session.

SUBJECT.—A candidate for a degree will be enrolled in one of the divisions of the school, and will do his work in the field of that division, or in one of the subjects of the field.

CREDITS.—To obtain a master's degree the candidate must earn not less than 30 semester credits.

In general, all graduate work must be completed within a period of not more than eight years.

For any master's degree except that of Ed. M., the candidate must earn not less than 12 semester credits in the courses primarily for graduate students (numbered 101-200 or thesis), and not more than 10 semester credits in courses outside of those offered by his division.

If a student does his work in the general field of a division, he must meet the special requirements of the division, and his program must be approved by the chairman of the division and the dean of the school.

If a student does his work in a single subject, he must meet the special requirements of that university department, and his program must be approved by the head of that department, the chairman of the division, and the dean of the school.

UNIVERSITY OF NEW HAMPSHIRE

To obtain the degree of master of education, the student must meet the requirements of that division, and his program must be approved by the chairman of the division and the dean of the school.

TRANSFERRED CREDITS.—Of the total credits required for a master's degree, not more than six may be transferred from another graduate school.

GRADES.—The passing grade in the Graduate school is 70. An average grade of at least 80 in not less than 30 semester credits is required.

GRADUATE CREDITS FOR SENIOR STUDENTS.—Senior students in the University of New Hampshire must register in the Graduate school for any work for which they may subsequently apply for graduate credit.

THESIS

If a thesis is required, the candidate must file with the executive committee, for its approval, a statement of the subject at least six months before the degree is to be conferred, and no credit shall be given until the completed thesis has been approved. The thesis must be approved by a committee of at least three members, named by the division chairman, and including the division chairman and the heads of the departments concerned.

All theses must be typewritten upon standard paper, eight and one-half by eleven inches, medium weight, neatly bound in black cloth, and gilt-lettered on the first cover with the title, name of author, degree sought, and year of graduation. The title page should bear the following statement:

“A thesis submitted to the University of New Hampshire in partial fulfillment of the requirements for the degree of

master of arts
master of science
master of education

GRADUATE SCHOOL

master of civil engineering
master of electrical engineering
master of mechanical engineering."

Whenever a thesis is printed, it must, if possible, be designated as having been accepted as a master's thesis by the University of New Hampshire.

Two copies of the approved thesis ready for binding, and an approved abstract of not more than 750 words, shall be turned in to the Graduate school office not less than five days before commencement, together with a treasurer's office receipt for binding fee.

EXAMINATIONS

A candidate for a degree must meet the regular requirements as to examinations in the courses for which he is registered, and such further requirements as may be imposed by the university department, or the division in which he has taken his work.

DESCRIPTION OF SUBJECTS

Subjects numbered 51-100 are open to advanced undergraduates and graduate students. Names of the instructors of subjects numbered 51-100 are omitted in this catalog. Subjects numbered 101-200 are primarily for graduate students. In this catalog, subjects between 101-200 are listed in advance of the subjects between 51-100.

DIVISION OF BIOLOGICAL SCIENCES

ORMOND R. BUTLER, *Professor of Botany*, CHAIRMAN; CHARLES A. BOTTORFF, JR., *Assistant Professor of Poultry Husbandry*; T. BURR CHARLES, *Professor of Poultry Husbandry*; JAMES G. CONKLIN, *Assistant Professor in Entomology*; MORRIS S. COVER, *Instructor in Poultry Husbandry*; STUART DUNN, *Assistant Professor of Botany*; WILLIAM R. EADIE, *Instructor in Zoölogy*; F. GAYNOR EVANS, *Instructor in Zoölogy*; LLOYD C. FOGG, *Associate Professor of Zoölogy*; LEON C. GLOVER, *Assistant Professor of Entomology*; JESSE R. HEPLER, *Associate Professor of Horticulture*; ALBION R. HODGDON, *Instructor in Botany*; C. FLOYD JACKSON, *Professor of Zoölogy*; L. PHELPS LATIMER, *Assistant Professor of Horticulture*; CARL L. MARTIN, *Assistant Professor of Veterinary Science*; MARIAN E. MILLS, *Assistant Professor of Botany*; HERBERT C. MOORE, *Assistant Professor of Dairy Husbandry*; KENNETH S. MORROW, *Professor of Dairy Husbandry*; WALTER C. O'KANE, *Professor of Entomology*; FORD S. PRINCE, *Professor of Agronomy*; EDYTHE T. RICHARDSON, *Assistant Professor of Zoölogy*; ERNEST G. RITZMAN, *Research Professor in Animal Husbandry*; LAWRENCE W. SLANETZ, *Assistant Professor of Bacteriology*; WILLIAM W. SMITH, *Assistant Professor of Horticulture*; LORING V. TIRRELL, *Professor of Animal Husbandry*; ALBERT F. YEAGER, *Professor of Horticulture*.

For major students in the fields of the several departments the minimum requirements for graduate standing are:

| | |
|-----------------------|---------------------|
| Agronomy | 18 semester credits |
| Animal industry | 24 semester credits |

GRADUATE SCHOOL

in either animal husbandry or dairy husbandry

| | |
|-------------------------|---------------------|
| Bacteriology | 16 semester credits |
| Botany | 19 semester credits |
| Entomology | 15 semester credits |
| Horticulture | 20 semester credits |
| Poultry husbandry | 24 semester credits |
| Zoölogy | 24 semester credits |

A thesis is required of all major students except those who take an approved course of study in not less than two, or more than three departments.

AGRONOMY

101, 102. AGRONOMY. Studies in comparative agronomy. The forage crops of the temperate zone. Origin and classification of the varieties grown. Germination, growth and maturation of crops; modifications induced by climate and management. Mr. Prince.

Prereq.: A major in agronomy or its equivalent.
Conferences, laboratory and field work. Hours to be arranged. 3 cr.

51, 52. ADVANCED SOILS. Under direction, the student may choose special phases such as soil fertility, soil classification and mapping, soil conservation or utilization. Practice in looking up literature and in preparation of reports and abstracts. Facilities will be available for special laboratory and field work in connection with specific problems.

Prereq.: Agronomy 1, 2, 3, 4. Number of credits to be arranged.

53, 54. ADVANCED FIELD CROPS. Handled similarly to agronomy 51 and 52, with attention to distinct phases of field crops work such as plant breeding in relation to crop improvement, pasture management, crop production and marketing, grading and

UNIVERSITY OF NEW HAMPSHIRE

judging. Training in searching the literature and preparing reports. Laboratory and field work are provided.

Prereq.: Agronomy 1, 2, 3, 4. Number of credits to be arranged.

ANIMAL INDUSTRY

101. ANIMAL NUTRITION. Incidental lectures, assigned reading, laboratory practice in methods of research with major emphasis on basal metabolism. Mr. Ritzman.

Prereq.: A major in animal or dairy husbandry, or equivalent. 3 cr.

102. ADVANCED DAIRY CATTLE. Special emphasis will be given to the analyses and formulating of breeding programs and to milk secretion and factors influencing the quantity and quality of milk. Mr. Morrow.

Prereq.: A major in animal husbandry or dairy husbandry. 2 lec.; 1 lab.; 3 cr.

103. ANIMAL HISTOLOGY. A microscopical study of the structure of the different tissues of farm animals. Mr. Martin.

Prereq.: Zoölogy 16, or equivalent. 2 lec.; 1 lab.; 3 cr.

104. GENERAL PATHOLOGY. A microscopical study of the different tissues of the animal's body, in reference to the pathological changes which occur as a result of disease conditions. Mr. Martin.

Prereq.: Animal husbandry 6, or equivalent. 2 lec.; 1 lab.; 3 cr.

105. PROBLEMS IN ANIMAL BREEDING. Studies in practical breeding problems with beef and dual-purpose cattle, sheep, horses, and hogs. The genetic principles important to successful livestock production will be emphasized. Mr. Tirrell.

Prereq.: A major in animal husbandry or dairy husbandry. 2 lec.; 1 lab.; 3 cr.

GRADUATE SCHOOL

106. MEATS, LIVESTOCK MARKETS AND PRODUCTS. The essential factors in meat selection, cutting, curing, and smoking; study and discussion relative to the problems of livestock marketing and the procedure in the large central markets. Trips are taken to various packing plants. Mr. Tirrell.

Prereq.: A major in animal husbandry or dairy husbandry. 2 lec.; 1 lab.; 3 cr.

107. TECHNICAL CONTROL. Chemical and bacteriological laboratory methods used in the technical control of milk and milk products. Mr. Moore.

Prereq.: Dairy husbandry 10, or equivalent. 2 lec.; 1 lab.; 3 cr.

109, 110. SPECIAL PROBLEMS IN DAIRY MANUFACTURE. Detailed study of some special phase of dairy manufacturing. Mr. Moore.

Prereq.: A major in dairy husbandry. Conferences and special assignments. 3 cr.

111, 112. SPECIAL PROBLEMS IN DAIRY PRODUCTION. Study of some special phase of breeding or feeding as related to dairy herd management. Mr. Morrow.

Prereq.: A major in animal husbandry or dairy husbandry. Conferences and special assignments. 3 cr.

52. ANIMAL HUSBANDRY SEMINAR. Library and reference work and the preparation of papers on various animal husbandry subjects of timely importance.

Prereq.: Animal husbandry 3 and 51. Hours and credits to be arranged.

51. MARKET MILK. The producing, handling, and distributing of market and certified milk; dairy farm inspection; control of milk supply. 2 lec.; 1 lab.; 3 cr.

UNIVERSITY OF NEW HAMPSHIRE

52. ADVANCED DAIRY SCIENCE. Basic data, fundamental observations, and discussions of research contributing to the present status of the dairy industry.

Prereq.: Adequate preparation in chemistry and bacteriology. 2 lec.; 2 cr.

54. DAIRY SEMINAR. Recent experiment station and other literature covering the field of dairying. Practice in looking up literature and in the preparation of oral and written reports. 1 lec.; 2 cr.

56. MILK PRODUCTION. Feeding and management of dairy animals; calf feeding; raising young stock; feeding for economical milk production. 2 lec.; 1 lab.; 3 cr.

58. ICE CREAM. The making, handling, and marketing of ice cream and ices. 2 lec.; 1 lab.; 3 cr.

BACTERIOLOGY

101. PHYSIOLOGY OF BACTERIA. A study of the growth, nutrition, and metabolism of bacteria; influence of physical and chemical environment on growth; bacterial enzymes; protein decomposition and fermentation. Mr. Slanetz.

Prereq.: Bacteriology 51, 55, 56. 3 lec.; 3 cr.

102. FOOD AND SANITARY BACTERIOLOGY. Types and characteristics of bacteria, yeast and molds in foods; methods of food preservation; food infections and intoxications; laboratory methods for the microbiological examination of spoiled foods. Bacteriological and public health aspects of eating utensils sanitation; water supply, swimming pool, lake and salt water sanitation; sewage and garbage disposal; and industrial wastes. Mr. Slanetz.

Prereq.: Bacteriology 51, 55, 56. 3 lec.; 3 cr.

104. SYSTEMATIC BACTERIOLOGY. A study of the development of a systematic classification of bacteria; modern methods

GRADUATE SCHOOL

of nomenclature and classification; problems encountered in the classification of bacteria. Mr. Slanetz.

Prereq.: Bacteriology 51, 55, 56. 2 lec.; 2 cr.

51. PATHOGENIC BACTERIOLOGY AND IMMUNOLOGY. The morphological, cultural, biochemical and serological characteristics of pathogenic microorganisms. Methods of disease diagnosis, prevention and treatment. Infection and resistance, antigens and antibodies, practical serological technique for disease diagnosis and identification of bacteria.

Prereq.: Bacteriology 2. 2 lec.; 2 lab.; 4 cr.

55, 56. ADVANCED BACTERIOLOGY. Special problems, depending upon the training and desire of the student. Elective only upon consultation.

Prereq.: Bacteriology 2 and chemistry 47 and 48, or its equivalent. Credits to be arranged.

57, 58. BACTERIOLOGY SEMINAR. Reports and discussions on current literature and recent developments in bacteriology.

Prereq.: Bacteriology 2 and the consent of instructor. One 2-hour period. 1 cr.

BOTANY

101. THE CHLOROPHYLL-BEARING CRYPTOGRAMS. Morphology and physiology of the ferns, mosses, liverworts, and algae with special reference to the representative forms most commonly met with. Miss Mills.

Prereq.: Botany 1, 2. 1 lec.; 2 lab.; 3 cr.

102. PLANT ECOLOGY AND PLANT GEOGRAPHY. Requirements for growth; specialization and adaptation; geographic and physiographic relations. Regional floras. Interpretation and classification of habitat. Specific problems are assigned. Mr. Hodgdon.

Prereq.: Botany 52. Incidental lectures, laboratory and field work. 5 cr.

UNIVERSITY OF NEW HAMPSHIRE

103, 104. FUNGICIDES. Preparation and use of the copper and sulphur fungicides. Changes induced upon sprayed plants and effect of environmental factors upon these changes. Mr. Butler.

Prereq.: Botany 5. Incidental lectures, laboratory.
3 cr.

105. PLANT PHYSIOLOGY. Absorption, conduction, transpiration and excretion of water, and effect of environmental factors upon these phenomena; mineral nutrition; carbon and nitrogen assimilation. Mr. Dunn.

Prereq.: Botany 4. Laboratory and assigned reading. 5 cr.

106. PLANT PHYSIOLOGY. Digestion of carbohydrates, fats and proteids, respiration and fermentation; effect of external conditions on growth, paratonic and autonomous movements. Mr. Dunn.

Prereq.: Botany 4. Laboratory and assigned reading. 5 cr.

107. PLANT HISTOLOGY. General morphology of the tissue systems; the primary tegumentary tissue; the fundamental tissue system, the vascular tissue system, development of secondary members, formation of secondary tissue. Mr. Butler.

Prereq.: Botany 3. Laboratory and assigned reading. 3 cr.

108. DISEASES OF TREE AND BUSH FRUITS. The bacterial and fungous diseases of fruits, their symptoms, cause and prevention. Mr. Dunn.

Prereq.: Botany 5. Laboratory and assigned reading. 3 cr. (Given in alternate years with 109.)

109. DISEASES OF FARM CROPS. The bacterial and fungous diseases of vegetables, their symptoms, cause and prevention. Mr. Dunn.

GRADUATE SCHOOL

Prereq.: Botany 5. Laboratory and assigned reading. 3 cr. (Given in alternate years with 108.)

52. ADVANCED SYSTEMATIC BOTANY. The higher plants of our native flora. The student is required to collect an herbarium of 60 specimens.

Prereq.: Botany 1. Occasional lectures, laboratory work, field trips. 2 cr.

53, 54. ADVANCED BOTANY. The subject matter will depend upon the training and desire of the student. Elective only upon consultation. Credits to be arranged.

ENTOMOLOGY

The following courses represent a sequence of studies arranged to include such branches as insect anatomy, insect toxicology, insect physiology, details of taxonomy, insect behavior, insect ecology, problems of dispersion, the organization of research, the organization of regulatory measures, and other phases involved in professional entomology.

101, 102. GRADUATE ENTOMOLOGY. Mr. O'Kane, Mr. Glover, Mr. Conklin. Hours and credits to be arranged.

103, 104. GRADUATE ENTOMOLOGY. Mr. O'Kane, Mr. Glover, Mr. Conklin. Hours and credits to be arranged.

52. INSECTS OF ORCHARD AND GARDEN. The application of methods of insect control of typical injurious species. Life histories and habits of important insect pests of orchard, garden and certain field crops. Adapted especially for students in horticulture and in general agriculture.

Prereq.: Entomology 1. 1 lec.; 1 lab.; 2 cr. (Given in alternate years; not offered in 1939-40.)

53. INSECTS OF DOMESTIC ANIMALS. The insect enemies of domestic livestock; the life histories, habits and means of control. Adapted especially for students in animal husbandry.

UNIVERSITY OF NEW HAMPSHIRE

Prereq.: Entomology 1. 1 lec.; 1 lab.; 2 cr. (Given in alternate years; not offered in 1939-40.)

54. HOUSEHOLD INSECTS. MEDICAL ENTOMOLOGY. The life histories, habits and means of control of insects of the household and of stored products. The relation of insects to disease. Adapted especially for students in home economics. 1 lec.; 1 lab.; 2 cr.

56. FOREST ENTOMOLOGY. The life histories and habits of the more destructive forest insects and means of their control. Adapted especially for students in forestry.

Prereq.: Entomology 1. 1 lec.; 1 lab.; 2 cr.

57, 58. EXTERNAL MORPHOLOGY, CLASSIFICATION, INTERNAL ANATOMY AND PHYSIOLOGY. The anatomy and physiology of insects. The orders and families of insects.

Prereq.: Entomology 57 prerequisite for 58. Open to students only by permission of the head of the department. 2 lec.; 2 lab.; 4 cr.

59, 60. PROBLEMS IN APPLIED ENTOMOLOGY, LITERATURE, INVESTIGATIONAL METHODS. Problems involved in applied entomology. The literature of economic entomology. Investigational methods. Practice in arranging projects. Studies in the specialized phases of entomology.

Prereq.: Entomology 59 prerequisite for 60. Open to students only by permission of the head of the department. Hours and credits to be arranged.

HORTICULTURE

Students will find the department well equipped for fundamental research on horticultural problems.

101. FLOWER BUD FORMATION. The influence of soil management, orchard fertilization and resultant chemical composition of fruit plants on flower bud formation and alternate bearing. Mr. Yeager.

GRADUATE SCHOOL

Prereq.: Agricultural chemistry 2, horticulture 5.
2 rec.; 2 cr.

102. METHODS OF HORTICULTURAL RESEARCH. An examination of methods used in laboratory and field by horticultural investigators. Mr. Latimer, Mr. Smith.

Prereq.: Agricultural chemistry 2, botany 4, horticulture 54 or 65, mathematics 5, 6 or 21, 22.
2 rec.; 2 cr.

103. WINTER INJURY. The physiology of winter injury to fruit plants. Mr. Smith.

Prereq.: Botany 4, horticulture 5. 2 rec.; 2 cr.

105. PROPAGATION AND GROWTH. The problems of water relations, rest period, propagation, pruning and thinning orchard fruits. Mr. Latimer.

Prereq.: Agricultural chemistry 2, botany 4, horticulture 54. 2 rec.; 2 cr.

106. POLLINATION AND FRUIT SETTING. Genetical and environmental factors affecting the production of fruit. Mr. Latimer.

Prereq.: Botany 4 (may be taken concurrently), horticulture 54, zoölogy 49. 2 rec.; 2 cr.

107. FRUIT STORAGE. Factors affecting color development and the keeping of fruit in storage. Mr. Smith.

Prereq.: Agricultural chemistry 2, botany 4, horticulture 5. 2 rec.; 2 cr.

108. VEGETABLE PROBLEMS. A study of the physiological problems involved in vegetable production. Mr. Hepler.

Prereq.: Botany 4 (may be taken concurrently), horticulture 65. 2 rec.; 3 cr.

125, 126. RESEARCH IN HORTICULTURE. Mr. Hepler, Mr. Latimer, Mr. Smith.

Prereq.: Horticulture 102 (may be taken concurrently). Credits to be arranged.

UNIVERSITY OF NEW HAMPSHIRE

54. ADVANCED POMOLOGY; ORCHARD AND SMALL FRUITS. Fundamental principles and experimental data and their application to orchard problems such as growth and rest period in fruit plants, water requirements, soil management, pruning, fruit bud formation, fruit setting, pollination, thinning, and winter injury.

Prereq.: Botany 1, 2 and horticulture 5. 2 lec.;
2 cr.

55. SYSTEMATIC SURVEY OF FRUITS. Important species of fruits and nuts of temperate regions and their botanical relationships. The history, distribution, and merits of each species, and the horticultural varieties developed from it.

Prereq.: Botany 1, 2 and horticulture 5. 2 lec.;
2 cr. (Given in alternate years; not offered in
1939-40.)

65. ADVANCED VEGETABLE GARDENING. The management of commercial vegetable gardens. Systematic study of the species and varieties of the more important families of vegetables. Mr. Hepler.

Prereq.: Horticulture 14. 2 lec.; 1 lab.; 3 cr.

91, 92. HORTICULTURAL SEMINAR. A review of recent horticultural literature and methods of investigational work. Students are required to prepare and present papers on selected topics. Horticultural staff. 2 lec.; 2 cr.

94. EVOLUTION AND IMPROVEMENT OF PLANTS. Application of the principles of genetics to agricultural plant-breeding. Hybridization and selection as means of improving horticultural varieties. Mr. Hepler.

Prereq.: Zoölogy 49. 2 lec.; 2 cr. (Given in alternate years; not offered in 1939-40.)

GRADUATE SCHOOL

POULTRY HUSBANDRY

101. **POULTRY HISTOLOGY.** A cellular study of the normal structure of the tissues of the chicken's body. Microscopic slides showing the normal tissues, will be studied in the laboratory. Mr. Martin, Mr. Bottorff and Mr. Cover.

Prereq.: Poultry husbandry 15. 2 lec.; 1 lab.; 3 cr.

102. **GENERAL PATHOLOGY OF POULTRY.** This course is designed to give a general understanding concerning the alterations in normal structures and functions of the different organs of the body caused by disease processes. Microscopic tissue slides showing these processes will be studied in the laboratory. Mr. Martin.

Prereq.: Poultry husbandry 101. 2 lec.; 1 lab.; 3 cr.

103. **POULTRY PHYSIOLOGY.** A study of the functions of the various systems of organs constituting the body of the fowl. Certain physiological processes will be illustrated. Mr. Cover.

Prereq.: Poultry husbandry 15. 3 lec.; 3 cr.

104. **POULTRY DISEASES.** An advanced study of poultry diseases and parasites. Also includes post-mortem and laboratory examination of fowl, with discussion of diagnosis, prevention, control, and treatment of the diseases encountered. Mr. Bottorff.

Prereq.: Poultry husbandry 15, 101, 103. 2 lec.; 1 lab.; 3 cr.

107, 108. **SEMINAR.** A survey of recent literature and research in poultry husbandry. Departmental staff. 1 cr.

109 or 110. **PROBLEMS.** Each student with his advisers will select problems for detailed study. A written report will be required. Departmental staff. 1 or 2 cr.

UNIVERSITY OF NEW HAMPSHIRE

53, 54. POULTRY PROBLEMS. Students are given a selection of various problems and are required to compile and present accurate and detailed information in their solutions. Hours and credits to be arranged.

ZOÖLOGY

101, 102. ADVANCED VERTEBRATE TAXONOMY AND ECONOMIC FIELD ZOÖLOGY. A critical examination of select groups of vertebrates with special reference to local forms, their classification, distribution, and general ecology. The laboratory work will deal with economic field zoölogy and will consist of special life history studies, detailed ecological surveys of local areas, control of injurious animals, food habit studies, census taking, and study factors controlling animal numbers. Mr. Jackson and Mr. Eadie.

Prereq.: Three years' work in zoölogy. 2 rec.;
2 lab.; 4 cr.

103. VERTEBRATE EVOLUTION. A study of the evolution and relationship of the various groups of both living and fossil vertebrates as shown chiefly by paleontological and osteological evidence. Mr. Evans.

Prereq.: Comparative anatomy. 3 lec.; 1 lab.;
4 cr.

104. ADVANCED COMPARATIVE ANATOMY. The detailed study of the comparative anatomy of certain select groups of vertebrates. Mr. Eadie.

Prereq.: Comparative anatomy. 2 lec.; 2 lab.;
4 cr.

105, 106. NEUROLOGY. A detailed study of the morphology and physiology of the nervous system of vertebrates with special emphasis on the histology and physiology of the human nervous system. Mrs. Richardson.

Prereq.: Three years' work in zoölogy. 3 rec.;
1 lab.; 4 cr.

GRADUATE SCHOOL

107, 108. **BIOLOGY OF DEVELOPMENT.** A study of the factors involved in the structure of the cell, in histogenesis, and in organogeny. The problems related to cell structure and function will be discussed. Cell specificity, physiological maturity, symmetry, organization, rate of development and maturation will be considered. Mr. Fogg.

Prereq.: Histology and entomology. 2 rec.; 2 lab.; 4 cr.

51, 52. **INVERTEBRATE ZOÖLOGY.** The structure, habits, and ecological relationships of the different groups of invertebrate animals. Given at the Isles of Shoals Marine laboratory during the summer session.

53, 54. **HISTOLOGY AND DEVELOPMENT.** Microscopical anatomy of normal vertebrate tissue. The fundamental principles of embryonic development. Emphasis on human relationship. Prepared slides of tissues are available and type forms of embryos. Especially designed for pre-medical and pre-dental students, and for majors in zoölogy.

Prereq.: Zoölogy 1, 2, 15, 16. Zoölogy 53 prerequisite for 54. 3 lec.; or rec.; 1 lab.; 4 cr.

57, 58. **LABORATORY TECHNIQUE.** A general laboratory course in methods used in preparation of zoölogical material, microscope slides, mounting embryos, making serial sections, etc. The course will be adapted to individual needs as far as possible.

Prereq.: Permission of the instructor. Zoölogy 57 prerequisite for 58. 1 lec.; 2 lab.; 3 cr.

59, 60. **ADVANCED PHYSIOLOGY.** Human physiology with special emphasis on nutrition, circulation, respiration, excretion and secretion. Lectures, assigned topics and laboratory experiments.

Prereq.: Two years' work in zoölogy. Zoölogy 59 prerequisite for 60. 3 lec. or rec.; 1 lab.; 4 cr.

UNIVERSITY OF NEW HAMPSHIRE

61, 62. CYTOLOGY AND GENETICS. A detailed study of the cell, including morphology, the chemical and physical nature of protoplasm, mitosis, meiosis, syngamy, and related phenomena leading up to the physical basis of inheritance and the study of Mendel's laws, the expression and interaction of the genes, linkage, sex and its inheritance, the inheritance of quantitative characters, and the types and causes of variations.

Prereq.: Two years' work in zoölogy. Zoölogy 61 prerequisite for 62. 3 lec.; 1 lab.; 4 cr. (Given in alternate years; offered in 1939-40.)

71, 72. VERTEBRATE FIELD ZOÖLOGY AND TECHNIQUE. General ecological principles as applied to vertebrate animals; types of habitats and characteristic vertebrate associations; relation of the animals to environment. Organization and use of field equipment; collection of scientific data in the field. Adapted for students interested in fish and game management or other phases of economic zoölogy or in outdoor recreation.

Prereq.: Permission of the instructor. 3 lec.; 1 lab.; 3-4 cr.

BIOLOGY-EDUCATION (BI-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL BIOLOGY.

Given at the Isles of Shoals Marine laboratory during the summer school.

EDUCATION-ZOÖLOGY (ED-ZOÖL) 93, 94. SUPERVISED TEACHING IN ZOÖLOGY. 2-3 cr.

95, 96. PROBLEMS OF CONSERVATION RESEARCH. Open to advanced students or those who show unusual promise in the field of research. Problems in all phases of conservation work and specifically in applied chemistry, zoölogy, ecology, genetics, limnology and silviculture. Nature of problems to be determined by the need of the New Hampshire Fish and Game department for research, and the background and interests of individual stu-

GRADUATE SCHOOL

dents. Representative from the New Hampshire Fish and Game department.

Prereq.: Permission of the instructor. 1 conference, 2 lab.; 4 cr.

97, 98. SPECIAL PROBLEMS AND SEMINAR. Seminar discussions on current zoölogical literature conducted each week. Advanced students may elect a special problem provided they present a detailed outline of the subject and furnish adequate proof of their ability to carry it out with available equipment.

Prereq.: Permission of the instructor. Credits to be arranged.

DIVISION OF EDUCATION

A. MONROE STOWE, *Professor of Education*, CHAIRMAN; HARLAN M. BISBEE, *Associate Professor of Education*; EVERETT B. SACKETT, *Associate Professor of Education*.

The graduate work of students in education is designed to supplement their undergraduate studies in such ways as to prepare them most effectively for the professions of secondary-school teaching or public school administration.

For admission to candidacy for a master's degree in education, a student must present, in addition to a bachelor's degree, evidence of having satisfactorily completed (a) the course in psychological principles of secondary education or its equivalent, (b) eighteen semester credits in a teaching major subject, and (c) twelve semester credits in a first teaching minor subject.

Candidates for the master's degree in education must submit evidence of having satisfactorily completed the following courses in education or their equivalents either as undergraduate or graduate students:

EDUCATION 51, 52. SOCIAL PRINCIPLES OF SECONDARY EDUCATION. (6 cr.)

EDUCATION 61 or 62. PRINCIPLES AND PROBLEMS OF TEACHING IN THE SECONDARY SCHOOL. (3 cr.)

UNIVERSITY OF NEW HAMPSHIRE

-EDUCATION 91 or 92. (A course in problems in the teaching of the major subject, 3 cr.)

-EDUCATION 91 or 92. (A course in problems in the teaching of the minor subject, 3 cr.)

Two of the three following courses:

HISTORY 53. HISTORY OF CIVILIZATION AND EDUCATION. (3 cr.)

EDUCATION 75. DEMOCRACY IN EDUCATION AND CHARACTER DEVELOPMENT. (3 cr.)

EDUCATION 76. PHILOSOPHY OF EDUCATION. (3 cr.)

The candidate must also present evidence of having taught successfully for three or more years or, in lieu of such successful teaching, evidence of having satisfactorily completed one semester of supervised teaching, Education 94. Graduate students successfully completing Education 94 with a grade of at least 75 will receive nine semester credits toward the master's degree. In the case of such students it will ordinarily require at least an academic year and a summer school session in which to meet the requirements of the master's degree in education.

*112. PROBLEMS OF SECONDARY SCHOOL ADMINISTRATION. A study of the basic principles of educational management, with their application to the following major problems of secondary school administration: schedule of classes; administration and organization of guidance, extra-curricular activities, and auxiliary agencies; housing secondary schools; building supervision; property accounting; office organization and management; records and reports; problems relating to the teaching and to the student personnel; relationships with local and state organizations; interpreting the schools to the public. 3 cr.

117. MATERIALS OF GUIDANCE. Tools of the educational-vocational counsellor; tests, rating scales, interviews, and vocational information; the meaning of statistical terms. Mr. Sackett.

* Not offered in 1939-40, but offered in the 1939 Summer school.

GRADUATE SCHOOL

To meet the needs of active secondary school teachers and administrators. Seniors with sufficient background of educational courses may be admitted by the instructor. One 2-hour lec., or rec., 2 cr.

118. ADMINISTRATION OF GUIDANCE. The testing program, student and alumni records, the guidance staff, counselling procedure, vocational surveys, vocational training, and problems of the counsellor. Adaptation of guidance theory to actual situations. Mr. Sackett.

No prerequisite, but the student without education 117 or its equivalent will be handicapped. Open to secondary school teachers and administrators and to others who may have the permission of the instructor. One 2-hour lec., or rec., 2 cr.

*122. PROBLEMS IN THE SUPERVISION OF HIGH SCHOOL TEACHING. This course, designed to be of service to supervising classroom teachers, headmasters, and superintendents, will be devoted to a study of problems of evaluating and improving high school teaching in and through constructive supervision. Pre-teaching and follow-up conferences. Remedial measures for type failures. Mr. Bisbee. 3 cr.

131, 132. SEMINAR IN EDUCATIONAL PROBLEMS. The problems to be studied will depend upon the interests of the students enrolled in the seminar. Mr. Stowe.

Open to seniors and graduate students majoring in education. Credits to be arranged.

*133. EDUCATIONAL ADMINISTRATION. This course is intended to provide practicing school administrators with an opportunity to compare and evaluate their experiences and, in addition, to become acquainted with recent developments in the field of educational administration. Teachers desiring an introduction to administrative theory and practice will find the course of value. The class will be conducted as a seminar.

* Not offered in 1939-40, but offered in the 1939 Summer school.

UNIVERSITY OF NEW HAMPSHIRE

Use will be made of the findings and methods of the recently completed Regents' Education Inquiry in New York state. The content of the course will be governed somewhat by the wishes of the class, but it is intended to include the following topics: finance, business management, supervision, personnel, and public relations. No fixed prerequisite, but those without administrative or teaching experience must secure the permission of the instructor. Mr. Sackett. 3 cr.

161, 162. AMERICAN COLLEGE AND UNIVERSITY EDUCATION—PRINCIPLES AND PROBLEMS. This course is devoted to a comparative and historical study of American college and university education. Among the topics studied are the following: a liberal education in a democracy; American colleges as agencies of American democracy; purposes and objectives in American collegiate education; academic college admission and degree requirements; American college curricular problems including curricular provisions for junior college and senior college years; selecting college students; educational and vocational guidance needed by college students; student activities; educational activities under the direction of college teachers and college teaching and testing techniques; college teaching as a profession in America; professional preparation for successful college teaching; and college and university administrative problems of interest to college teachers.

Assigned readings, class discussions, tests, and term papers embodying results of individual studies of problems investigated by members of the class. Mr. Stowe.

Open to graduate assistants, to assistants and members of the instructional staff of the university, and to graduate students planning to teach in the college or university field. 1 rec.; 2 cr.

51, 52. SOCIAL PRINCIPLES OF SECONDARY EDUCATION. The educationally significant aspects and needs of modern democratic society. The organization, functions, curricula and outstanding problems of American institutions of secondary education.

GRADUATE SCHOOL

Prereq.: Education 42, and education 51 prerequisite for 52. Required of students completing the university teacher-preparation curriculum. 3 rec.; 3 cr.

53. **LEARNING AND MEASUREMENTS.** A study of the learning process of the individual and a survey of measurements of intelligence and educational achievement. Administration of intelligence tests and construction of informal objective examinations.

Prereq.: Psychology 21 or 31. 3 lec. or rec.; 3 cr.

*55. **GENERAL EDUCATION PSYCHOLOGY.** A general survey of the applications of psychology to the educational field. The relation of factors of growth, learning, intelligence, individual differences and personality to more effective learning situations. The psychology of the teaching process, of the teacher, and of the pupil. 3 cr.

57, 58. **EXPERIMENTAL PSYCHOLOGY.** Standard experiments on sensation, perception, association, imagination, learning and reasoning. Emphasis on the development of the proper technique of psychological investigation.

Prereq.: Psychology 31. 1 lec.; 2 lab.; 3 cr.

61. **PRINCIPLES OF TEACHING IN THE SECONDARY SCHOOL.** (1) Secondary school objectives and the objectives in the teaching of secondary school subjects; (2) principles of teaching and of directing learning incorporated in teaching which meets the needs of high school students and attains the objectives of the secondary school; (3) secondary school tests and the ways in which teachers are endeavoring to ascertain the extent to which their objectives are being attained; (4) class management, the purpose of which is to insure conditions favorable to the attainment of the objectives of the secondary school.

* Not offered in 1939-40, but offered in the 1939 Summer school.

UNIVERSITY OF NEW HAMPSHIRE

Prereq.: Education 42. Required of students completing the university teacher-preparation curriculum. 3 rec.; 3 cr.

*63. SENSORY AIDS IN TEACHING. This course is planned to help teachers who wish to employ in their classroom work such instructional aids as photographs, diagrams, posters, glass slides, film slides, silent films, sound films and radio broadcasts.

The following subjects will be covered in illustrated discussions: the importance of supplementing the textbook in teaching; the classification of sensory aids; the evaluation of visual materials for projection; the glass slide as a teaching aid; the film projectors for still pictures; the opaque projector; the motion picture projector; the sound motion picture in education, and other practical problems in visual instruction. Inquiries relating to extending the use of visual aids will be welcomed. 2 cr.

64. ABNORMAL PSYCHOLOGY AND MENTAL HYGIENE. The maladjusted individual and the abnormal phenomena as found in feeble-mindedness, precocity, the neuroses and the psychoses. The disorders of perception, association, memory, judgment and the personality; recognition and diagnosis of the more common forms of abnormal behavior through presentation of case studies and visits to institutions. Prophylaxis through mental hygiene. Ways and means of maintaining mental balance through the cultivation of healthful attitudes and activities in home, school and community.

Prereq.: Psychology 21 or 31, or education 11.
3 lec. or rec.; 3 cr.

*65. THE DEVELOPMENT AND USE OF EXAMINATIONS IN MEASUREMENT. The place of measurement in the teaching process. The development of the measurement movement and an evaluation of it from the point of view of the classroom teacher. The construction and standardization of objective tests and the in-

* Not offered in 1939-40, but offered in the 1939 Summer school.

GRADUATE SCHOOL

terpretation of results. The improvement of teacher evaluations of pupil achievement and the rôle of teacher-made tests in the procedure. 3 cr.

71, 72. SEMINAR: SPECIAL PROBLEMS IN PSYCHOLOGY.

Prereq.: Two years of psychology. $\frac{1}{2}$ to 3 cr.

75. DEMOCRACY IN EDUCATION AND CHARACTER DEVELOPMENT. Discussion of student participation in high school control; social functions; the underlying principles of club work; the problem of character education and a discussion of the moral standards in our high school as revealed by investigations.

Prereq.: Education 42. 3 rec.; 3 cr.

76. PHILOSOPHY OF EDUCATION. The fundamental concepts and ultimate objectives of education, current educational doctrines and controversies, changes in educational procedures, historic background and philosophical implications.

Prereq.: Education 51, 52. 3 rec.; 3 cr.

*77. PHILOSOPHY OF VOCATIONAL EDUCATION IN A DEMOCRACY. The course deals with the nature of vocational education and its human significances in the large. Major topical divisions are as follows: 1. The meaning of education, of vocation, of vocational education. 2. The socio-economic background and its implications for education. 3. The functions of vocational education—(a) the selective; (b) the preparatory; (c) the creative. 4. Democratic versus authoritarian policy in vocational education. 5. The interorganic relations of the vocational, the civic, and the cultural aims in education. 3 cr.

*83. EDUCATIONAL AND VOCATIONAL GUIDANCE. This course is designed to make clear the problems of guidance which the school teacher, school administrator, student counselor, personnel manager, and the intelligent individual himself have to solve. The student is made familiar with the development and present practices in guidance work with the ethical, cultural,

* Not offered in 1939-40, but offered in the 1939 Summer school.

UNIVERSITY OF NEW HAMPSHIRE

political, and economic implications. The techniques that have proved of value in guidance work will be presented for consideration. The case method and case conference technique will be used during a portion of the course. The chief purpose of the course is to provide training to enable the ordinary classroom teacher to perform the more important guidance functions. In addition, training will be provided for counselors, deans, directors and supervisors of educational and vocational guidance. In the conduct of the course the instructor will pay attention to the problems of the rural and village teachers, as well as those teachers who may be situated in urban communities. The importance of the curriculum as a starting point for effective instruction will be emphasized. Major emphasis will be placed upon sound techniques of school procedure. Lectures by the instructor, assigned readings, problems, reports, discussions. 3 cr.

*84. SECONDARY EDUCATION IN THE JUNIOR HIGH SCHOOL. The course is designed to trace the evolution of the junior high school and to contrast it with earlier forms of school organization. Among the topics discussed are the particular features and functions of the school; the educational objectives and philosophy underlying its program; the attempt to humanize adolescent education; the school's function in a democracy; the junior high school as a community center; articulation between the junior high school and the elementary and senior high schools; building the school schedule. Considerable attention is given to the program of studies and the content of various courses of study in both small and large communities with the purpose of adapting this school unit to the problems of the present. Emphasis is placed upon an integrated curriculum. Consideration will be given in this course to extra-classroom activities and their articulation with classroom procedures, as well as a discussion of the home room. Lectures, assigned readings, problems and discussions. 3 cr.

*85. PRINCIPLES OF SECONDARY EDUCATION. The development and place of the secondary school in the American system of

* Not offered in 1939-40, but offered in the 1939 Summer school.

GRADUATE SCHOOL

education; aims and functions of secondary education in our democracy; upward and downward extension of secondary education; articulation with lower and higher educational institutions, and with the community; the secondary school pupil; adjustment of the work of the school to meet individual needs; the offerings, both curricular and extra-curricular, of the secondary school; place and relationships of school board, superintendent, headmaster and teachers. 3 cr.

COURSES IN PROBLEMS IN THE TEACHING OF HIGH SCHOOL SUBJECTS

The following courses in professionalized subject-matter are devoted to a study of problems of objectives, selection and organization of subject-matter, teaching and testing techniques and classroom management in the teaching of the respective subjects. A student desiring to do supervised teaching must complete with a grade of at least 75 one of these courses in the subject in which he hopes to do supervised teaching. These courses are taught by instructors in the respective subject-matter departments.

*AGRICULTURE-EDUCATION (AG-Ed) 95. THE SECONDARY SCHOOL PROGRAM IN AGRICULTURAL EDUCATION. A course designed primarily to meet the needs of teachers in service. Those desiring to qualify in part for positions as teachers of agriculture may register. The course will be divided into three units: (1) effective teaching of vocational agriculture; (2) planning, organizing and establishing satisfactory supervised farming programs; (3) extending the vocational agriculture program to out-of-school young men. The content deals with objectives, organization, selection of the group, and methods of teaching. Teachers in service should bring their yearly plans of work. Instruction trips are to be arranged and case studies will be supplied by members of the class. 2 cr.

*AGRICULTURE-EDUCATION (AG-Ed) 96. FARM SHOP WORK FOR THE TEACHER OF VOCATIONAL AGRICULTURE. This course will be

* Not offered in 1939-40, but offered in the 1939 Summer school.

UNIVERSITY OF NEW HAMPSHIRE

devoted to training in-service and prospective teachers in general farm shop skills, organization, presentation, record-keeping, and methods of teaching such types of farm shop work as tool-fitting, woodwork, cold and hot metal work; care, operation, maintenance and repair of tillage, seeding and harvesting machinery, together with such simple plumbing and tinsmithing as is ordinarily done in the farm workshop. 2 cr.

*BIOLOGY-EDUCATION (BIO-ED) 91, 92. BIOLOGY AND PROBLEMS IN THE TEACHING OF BIOLOGY IN THE HIGH SCHOOL. A general survey of the course of study of biology in secondary schools, methods of presenting the subject, choice of subject matter, collection and preparation of illustrative material, and the organization of laboratory work will be considered. Ample opportunity will be afforded for the collection of specimens for laboratory and demonstration purposes.

Prereq.: Some experience or training in biology or by permission of the instructor. 4½ cr. (Offered at the Isles of Shoals Marine Zoölogical laboratory.)

*COMMERCIAL SUBJECTS-EDUCATION (CS-ED) 91. PROBLEMS IN THE TEACHING OF COMMERCIAL SUBJECTS IN THE HIGH SCHOOL. This course, intended to be of service to teachers and prospective teachers of shorthand and typewriting, will be devoted to a consideration of the objectives of teaching these subjects, selection and organization of subject matter and techniques of instruction. Class discussions will be supplemented by observation of teaching. 3 cr.

*92. COMMERCIAL SUBJECTS-EDUCATION (CS-ED). PROBLEMS IN THE TEACHING OF OFFICE PRACTICE IN THE HIGH SCHOOL. Methods of organizing and presenting materials and including demonstrations of modern office machines. Part of the course will consist of practice in filing and practice in operating the more commonly used office machines. 3 cr.

ENGLISH-EDUCATION (ENG-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL ENGLISH. The selection and organization

* Not offered in 1939-40, but offered in the 1939 Summer school.

GRADUATE SCHOOL

of subject-matter, the most efficient methods of presenting this material, and the problems which arise within the field of the teaching of high school English.

Prereq.: Three years of English courses including English 19. Required of students majoring in English who plan to teach English in secondary schools. 2 lec.; 1 lab.; 3 cr.

*ENGLISH-EDUCATION (ENG-ED) 92. PROBLEMS IN THE TEACHING OF ENGLISH IN THE HIGH SCHOOL. This course deals with methods of organizing and presenting courses in both composition and literature. In the first part of the course, the development of composition interests will be discussed, followed by problems of structure, diction, and minimum essentials of grammatical and mechanical skills. In the second, the relation of literature to its historical and social background and its application to contemporary life will be stressed, along with the development of comprehension, interpretation, and appreciation. The course is also concerned with the correlation and coördination of English composition and literature with other subjects, and with motivation, testing, and the selection of course material. The sixth week of the course will be devoted to participation in and reporting on the work of the Writers' conference. 3 cr.

FRENCH-EDUCATION (FR-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL FRENCH. The special objectives, methods, and problems of high school French. Open only to seniors and graduate students who are planning to teach. Visits to schools to observe the work of experienced teachers arranged. Students may be given opportunity to assist in the work of French 1, 2.

Prereq.: Permission of head of department. 3 rec.; 3 cr.

GENERAL SCIENCE-EDUCATION (GS-ED) 91. PROBLEMS IN THE TEACHING OF GENERAL SCIENCE. Units of subject matter pre-

* Not offered in 1939-40, but offered in the 1939 Summer school.

UNIVERSITY OF NEW HAMPSHIRE

sented in the form of lecture-demonstrations and discussions, accompanied by assigned readings. The objectives and methods of teaching general science will be developed with the subject matter presentations. There will be opportunity for students to participate in lecture-demonstrations. 3 cr.

HISTORY-EDUCATION (HIST-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL HISTORY. The purposes and objectives of teaching of high school history; selection and organization of teaching material; teaching and testing techniques which may be advantageously used in teaching high school history; experiments in studying and teaching recent American history.

Open to students who have satisfactorily completed history 7, 8, government 1, 2, economics 1, 2 or 3, 4, and education 61. Three class meetings. 2 cr.

HISTORY-EDUCATION (HIST-ED) 92. PRACTICUM IN THE TEACHING OF HISTORY IN HIGH SCHOOLS. To aid teachers of world history, ancient, early European, and modern history. Appraisal of the difficulties and values of such courses; selection and organization of subject matter, considering the pupil's age and attainment level, to clarify factors and forces and processes of mankind in the past that make the present world more understandable. Objectives, curriculum variations, methods of presentation, reading and activity programs, testing, the teaching of current events, and other problems. The vision, the challenge, and the ideals of social studies instruction will be balanced by the reality of developing teachable units for classroom use. Individual guidance on special problems. One 2-hour rec.; 2 cr.

HOME ECONOMICS-EDUCATION (HE-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL HOME ECONOMICS. 3 lec. or rec.; 3 cr.

MATHEMATICS-EDUCATION (MATH-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL MATHEMATICS. The aims and values of secondary school mathematics, the recommendations of the

GRADUATE SCHOOL

national committee on mathematics requirements, and the state board requirements; also, the subject-matter and the sequence in which it should be presented in both junior and senior high schools, and the various techniques used in teaching secondary school mathematics. Errors, testing program and remedial teaching. Lectures, assigned readings and discussions.

Prereq.: Mathematics 8 or 34 and 7. Students preparing to teach mathematics in high school should register for this course. 3 rec.; 3 cr.

PHYSICAL EDUCATION-EDUCATION (PE-Ed) 91, 92. PROBLEMS IN THE TEACHING OF PHYSICAL EDUCATION FOR WOMEN. The organization of a comprehensive program of activities from the primary grades through college. Opportunity for supervised teaching in the grades and high school. 2 lec.; 4 lab.; 3 cr.

*PSYCHOLOGY-EDUCATION (PSYCH-Ed) 91. PROBLEMS IN THE TEACHING OF PSYCHOLOGY IN THE HIGH SCHOOL. This course is designed for secondary school teachers and administrators interested in developing in adolescents such appreciative understandings of human behavior and mental hygiene as will enable them to control their own conduct more efficiently and to influence the conduct of others more intelligently. The problems to be studied are of interest to teachers of English and the social studies as well as to high school teachers of psychology. Assigned readings, reviews and digests of textbooks and popular books on psychology and mental hygiene of interest to adolescents, class discussions, term papers and term paper conferences. Open to graduate students who have satisfactorily completed at least six semester credits in psychology or in psychology and educational psychology. Students registered for six semester credits may register for two semester credits in this course. Such students will not be required either to write term papers or to attend meetings of the class devoted to term paper conferences. 2-3 cr.

*SOCIAL STUDIES-EDUCATION (SS-Ed) 92. SEMINAR IN THE TEACHING OF THE SOCIAL STUDIES. This course deals with the

* Not offered in 1939-40, but offered in the 1939 Summer school.

UNIVERSITY OF NEW HAMPSHIRE

social studies curriculum in relation to society, with the problems of utilizing community resources and current events, and with the actual preparation of courses of study for some of the grade levels. Various problems will be introduced by faculty members and discussed by the group. Readings, oral and written reports, and extensive work on problems selected by the student. 3 cr.

COURSES IN SUPERVISED TEACHING

This work is required in the teacher-preparation curriculum. It is open only to students whose applications are approved by the head of the department of education and the supervisor of student teaching in the subject or subjects in which the applicant desires to do supervised teaching. Applications should be filed in the office of the department of education in October of the academic year in which the supervised teaching is to be done. No applications will be considered unless the applicant has completed with a grade of at least 75 the following courses in education: education 11 or 41, and 42, 51, 52, and 61, and, with an average grade of 75 or better, at least 18 semester credits in the subject-matter field in which he desires to teach under supervision. The applicant must also complete with a grade of at least 75 a course in the problems of teaching the subject in which he desires to do supervised teaching.

Graduate students may be enrolled for 9 credits of work in supervised teaching in the second semester of the academic year.

EDUCATION-AGRICULTURE (ED-AG) 93. SUPERVISED TEACHING IN HIGH SCHOOL AGRICULTURE.

EDUCATION-BIOLOGY (ED-BI) 93. SUPERVISED TEACHING IN HIGH SCHOOL BIOLOGY. Prereq.: Bi-Ed 91.

EDUCATION-BOTANY (ED-BOT) 93. SUPERVISED TEACHING IN HIGH SCHOOL BOTANY.

EDUCATION-CHEMISTRY (ED-CHEM) 94. SUPERVISED TEACHING IN HIGH SCHOOL CHEMISTRY. Prereq.: Ch-Ed. 91.

GRADUATE SCHOOL

EDUCATION-CIVICS (ED-CIV) 94. SUPERVISED TEACHING IN HIGH SCHOOL CIVICS. Prereq.: Hist-Ed 91.

EDUCATION-COMMERCE (ED-Cs) 94. SUPERVISED TEACHING IN HIGH SCHOOL COMMERCIAL SUBJECTS.

EDUCATION-ECONOMICS (ED-ECON) 94. SUPERVISED TEACHING IN HIGH SCHOOL ECONOMICS. Prereq.: Hist-Ed 91.

EDUCATION-ENGLISH (ED-ENG) 94. SUPERVISED TEACHING IN HIGH SCHOOL ENGLISH. Prereq.: Eng-Ed 91.

EDUCATION-FRENCH (ED-FR) 94. SUPERVISED TEACHING IN HIGH SCHOOL FRENCH. Prereq.: Fr-Ed 91.

EDUCATION-GENERAL SCIENCE (ED-GS) 94. SUPERVISED TEACHING IN HIGH SCHOOL GENERAL SCIENCE. Prereq.: GS-Ed 91.

EDUCATION-HISTORY (ED-HIST) 94. SUPERVISED TEACHING IN HIGH SCHOOL HISTORY. Prereq.: Hist-Ed 91.

HOME ECONOMICS-EDUCATION (HE-Ed) 94. SUPERVISED TEACHING IN HIGH SCHOOL HOME ECONOMICS. Prereq.: HE-Ed 91.

EDUCATION-INDUSTRIAL ARTS (ED-IA) 94. SUPERVISED TEACHING IN HIGH SCHOOL INDUSTRIAL ARTS.

EDUCATION-LATIN (ED-LAT) 94. SUPERVISED TEACHING IN HIGH SCHOOL LATIN.

EDUCATION-MATHEMATICS (ED-MATH) 94. SUPERVISED TEACHING IN HIGH SCHOOL MATHEMATICS. Prereq.: Math-Ed 91.

EDUCATION-PHYSICAL EDUCATION (ED-PE) 93, (93). DIRECTED TEACHING IN PHYSICAL EDUCATION.

EDUCATION-PHYSICAL EDUCATION (ED-PE) 94. SUPERVISED TEACHING OF PHYSICAL EDUCATION IN THE FIELD.

EDUCATION-PHYSICS (ED-PH) 94. SUPERVISED TEACHING IN HIGH SCHOOL PHYSICS. Prereq.: Ph-Ed 91.

UNIVERSITY OF NEW HAMPSHIRE

EDUCATION-SOCIOLOGY (ED-SOC) 94. SUPERVISED TEACHING IN HIGH SCHOOL SOCIOLOGY. Prereq.: Hist-Ed 91.

ZOOLOGY-EDUCATION (ZOÖL-ED) 93, 94. SUPERVISED TEACHING IN HIGH SCHOOL ZOOLOGY. Prereq.: Ed-Bi 91.

*96. THE IMPROVEMENT OF READING. A survey of the common practices and procedures in teaching reading and their relation to educational principles and psychology. Special attention will be given to the well defined growth periods in learning to read and to the diagnostic and remedial techniques for each period. The relation of reading to the cultural and content areas in the curriculum. Opportunity will be given to students to study specific problems in reading and to develop individual programs of instruction related to their own schools. While emphasis will be given to diagnostic and remedial procedures, much attention will be given to preventative teaching. 3 cr.

*97. PROBLEMS OF ELEMENTARY SCHOOL ADMINISTRATION. The course will be concerned with the problems arising in the administration of a modern elementary school. Some of these problems will be: What are the functions of the present elementary school? How should it be organized? What should be included in the school program? How should pupils be admitted, classified, and promoted? What system of "marks" and "report cards" should be used? How can instruction be improved effectively? What are the most effective types of public relation programs? How can the elementary school program be evaluated? Students will be encouraged, and wherever possible, will be asked to work out problems in relation to teaching positions held by each. This course is intended for superintendents of schools, elementary supervisors or principals, or persons preparing for such positions. Opportunities will be provided for individual conferences. 3 cr.

*98. ELEMENTARY SCHOOL CURRICULUM PROBLEMS. This course will consist of a study of the rapidly expanding elemen-

* Not offered in 1939-40, but offered in the 1939 Summer school.

GRADUATE SCHOOL

tary school curriculum, how it is being influenced by research studies, methods of teaching, and available teaching materials. Some of the more important curriculum problems to be considered are: What should be included in an elementary school curriculum? To what extent should the school subjects be separated, correlated, or integrated? What should be the content, grade placement, and teaching procedures in art, arithmetic, English, reading, safety, science, social studies, spelling, and writing? How can such traits as character and citizenship be developed effectually? What should be included in a co-curricular program? Problems of special interest to members of the class will be studied in greater detail. This course is intended for teachers, elementary supervisors or principals, curriculum directors, and school superintendents. Opportunities will be provided for individual conferences. 3 cr.

*99. THE TEACHING OF ARITHMETIC. The objectives of this course will be (1) to develop a broad conception of the place of arithmetic and elementary mathematics in modern life and in schools, (2) how to teach the beginning concepts in arithmetic, (3) how to develop skill and accuracy in computation and reasoning, (4) how to develop the social and informational phases, (5) to provide experiences with diagnostic and remedial procedures, (6) to study instructional materials including text and work books, and (7) to develop the relationships to the newer psychologies of learning. Each student will be expected to study intensively some individual problem and to develop a program of instruction relating to this personal problem. 3 cr.

DIVISION OF ENGINEERING

GEORGE W. CASE, *Professor of Mechanical Engineering*,
CHAIRMAN; EDMOND W. BOWLER, *Professor of Civil Engineering*;
EDWARD T. DONOVAN, *Assistant Professor of Mechanical Engineering*;
LEON W. HITCHCOCK, *Professor of Electrical Engineering*;
WILLIAM B. NULSEN, *Assistant Professor of Electrical Engineering*;
RUSSELL R. SKELTON, *Associate Professor of Civil Engineering*.

* Not offered in 1939-40, but offered in the 1939 Summer school.

UNIVERSITY OF NEW HAMPSHIRE

Graduate work is offered in civil, electrical and mechanical engineering leading to the degrees of master of civil engineering, master of electrical engineering, and master of mechanical engineering, respectively. A thesis of professional character and no fewer than twelve semester credits of course work constitute the requirements for the degree.

The following courses, which require as prerequisites the completion of undergraduate work in these fields, are available.

CIVIL ENGINEERING

101, 102. ADVANCED HYDRAULICS. Dimensional analysis, dynamic similarity, mechanics of viscous fluids, fluid flow in pipes, non-uniform flow, alternate stages of flow in open channels, hydraulic pump and their application to engineering practice. Mr. Bowler.

Prereq.: Civil engineering 34. 3 rec.; 3 cr.

103, 104. HIGHWAY ENGINEERING AND ADMINISTRATION. A detailed study of highway transportation, administration and finance. The problems of city traffic, control, safety and street and highway design are analyzed. This course is arranged to develop an ability in highway planning, administration and engineering design to meet present and future requirements. Provision is made to meet the special needs of the student. Mr. Skelton.

Prereq.: Civil engineering 31. 3 lec.; 3 cr.

ELECTRICAL ENGINEERING

101, 102. ADVANCED CIRCUIT THEORY. A continuation of Electrical engineering 50, including the treatment of unbalanced circuits by the method of symmetrical components. Mr. Nulsen. 3 rec.; 3 cr.

103, 104. ELECTRICAL TRANSMISSION OF POWER AND COMMUNICATION. A study of the electrical and mechanical factors involved in the design, construction and operation of recent power system installations. An investigation of some of the more advanced problems in the field of communication. 3 rec.; 3 cr.

GRADUATE SCHOOL

MECHANICAL ENGINEERING

101, 102. ADVANCED THERMODYNAMICS. The general equations of thermodynamics, and their application to fluids such as air and steam; heat transmission; current applications and advances in thermodynamics. Mr. Donovan. 3 rec.; 3 cr.

103, 104. ENGINEERING ECONOMY. Social aspects of engineering economy, studies and methods of investigation of the safety and earning power of invested funds in old and new enterprises. Mr. Case. 3 rec.; 3 cr.

DIVISION OF LANGUAGE AND LITERATURE

HAROLD H. SCUDDER, *Professor of English*, CHAIRMAN; SYLVESTER H. BINGHAM, *Assistant Professor of English*; ALBERT F. BUFFINGTON, *Assistant Professor of Languages*; PAUL L. GRIGAUT, *Assistant Professor of Languages*; WILLIAM G. HENNESSY, *Associate Professor of English*; THOMAS H. MCGRAIL, *Assistant Professor of English*; CLIFFORD S. PARKER, *Professor of Languages*; ALFRED E. RICHARDS, *Professor of English*; PAUL S. SCHOEDINGER, *Assistant Professor of English*; JAMES T. SCHOOLCRAFT, JR., *Assistant Professor of Languages*; CARROLL S. TOWLE, *Associate Professor of English*; JOHN S. WALSH, *Associate Professor of Languages*.

SPECIAL REQUIREMENTS FOR CANDIDACY

To be admitted to candidacy for the degree of master of arts in language and literature, the student must show by his academic or professional record that he is prepared to take the courses in his field of study.

To be admitted to candidacy for the degree of master of arts in English or languages, the student must have met requirements substantially equal to those set up for the fulfillment of an undergraduate major in English or languages at the University of New Hampshire.

DIVISIONAL REQUIREMENTS FOR THE MASTER'S DEGREE

The student who is a candidate for a master's degree in the general field of the division of language and literature will take a program of courses in two foreign languages and in English.

UNIVERSITY OF NEW HAMPSHIRE

SPECIAL REQUIREMENTS FOR THE MASTER'S DEGREE ENGLISH

The student who is a candidate for a master's degree in English must earn at least six credits in the courses which are primarily for graduate students (numbered 101 to 200); six credits in allied subjects; and no more than twelve credits in courses numbered 51 to 100. If he presents a thesis it must be one worth no fewer than six credits. The writing of a thesis may under some circumstances be omitted and in such cases an additional three-credit course in English and an additional three-credit course in an allied subject will be required, each numbered 101 or higher.

A reading knowledge of French, German, or Latin will be required of the candidate, and a certificate from the language department will be accepted as satisfactory proof that this requirement has been met.

FRENCH, GERMAN, LATIN

The requirements for the degree of master of arts in French, German, and Latin are as follows: the writing of an acceptable thesis embodying the results of independent investigation (equivalent to 4 to 9 semester credits in courses primarily for graduate students); the passing of a special oral or written examination at the end of the period of graduate study.

A student in languages may take all his work in French or in combinations of French and Latin, or French and German. No more than six semester credits may be earned for courses outside this division.

ENGLISH

101, 102. COLLATERAL READING. A study, in translation, of selections from the great writers of literature. In the first semester special attention is given to Dante's *Divine Comedy*; in the second, to Cervante's *Don Quixote* and to Goethe's *Faust*. Lectures, recitation, and written reports. Mr. Richards. 3 rec.; 4 cr.

GRADUATE SCHOOL

103, 104. **THE FAUST STORY.** A study of the Faust legend as it is found in the literature of Germany and of England. Special attention is given to Marlowe's drama and to the later forms of the legend in English literature. Mr. Richards. 3 rec.; 3 cr. (Given in alternate years; offered 1939-40.)

105, 106. **SPENSER AND HIS TIMES.** A study of the life and works of Edmund Spenser as they mirror the development of English poetry and history in the sixteenth century. Mr. Richards. 3 rec.; 4 cr.

107, 108. **STUDIES IN AMERICAN LITERATURE.** An intensive study of the life and work of a single author. In some cases the course will be concluded in a single semester, in others, continued throughout the year. The assignments will vary with the individual student. Mr. Scudder.

Prereq.: English 11 and 12, or their equivalent.
3 lec.; 3 cr.

109, 110. **SHAKESPEARE.** An intensive study of from four to six of Shakespeare's plays, supplemented by a study of the history of Shakespearean scholarship from the seventeenth century to the present. Mr. Hennessy.

Prereq.: English 53 and 54, or their equivalent.
3 lec.; 3 cr.

111, 112. **CONTEMPORARY DRAMA.** A study of the modern drama in Europe and America from Ibsen to the present day. Mr. Hennessy.

Prereq.: English 52 or its equivalent. 3 lec.; 3 cr.

113, 114. **THE SEVENTEENTH CENTURY.** Seventeenth century prose and verse, and the drama after 1660. A survey of the whole period, with special emphasis on the historical background, the Restoration theatre, and the changes in prose and verse styles. Mr. Towle. 3 rec.; 3 cr.

115, 116. **THE AUGUSTAN AGE.** General and special studies in the works and lives of Swift, Pope, Gay, Arbuthnot, Addison and Steele and their associates. Mr. Schoedinger. 3 lec.; 3 cr.

UNIVERSITY OF NEW HAMPSHIRE

117, 118. THE NON-DRAMATIC LITERATURE OF THE ENGLISH RENAISSANCE. Poetry and prose from Erasmus to John Donne, exclusive of Spenser. Lectures, reports, and constant outside reading. Mr. McGrail. 3 lec.; 3 cr.

119. CARLYLE. A critical study of Thomas Carlyle as a writer and thinker. Mr. Bingham. 3 lec.; 3 cr.

120. TENNYSON AND BROWNING. Studies of the two major poets of Victorian England. Mr. Bingham. 3 lec.; 3 cr.

52. INTRODUCTION TO DRAMA. This course is a comprehensive survey of dramatic literature from the Greek drama to the present. 3 rec.; 3 cr. (Given in alternate years; offered 1939-40.)

53, 54. SHAKESPEARE'S PLAYS. This course comprises a study of the major histories, comedies, and tragedies. Shakespeare is interpreted as poet and dramatist. 3 rec.; 3 cr.

55. MILTON. A detailed study of Milton's minor poetry and the *Paradise Lost*. Consideration is also given to the social, political, and religious history of Milton's day. 3 rec.; 3 cr. (Given in alternate years; offered 1939-40.)

57. THE ENGLISH NOVEL IN THE EIGHTEENTH CENTURY. The novel from Defoe through the Gothic romance. There will be lectures and constant reading. 3 rec.; 3 cr. (Given in alternate years; offered 1939-40.)

59. THE ENGLISH NOVEL OF THE NINETEENTH CENTURY. A study of the novel from Jane Austen to Thomas Hardy. 3 rec.; 3 cr. (Not offered in 1939-40.)

61, 62. THE ENGLISH ROMANTIC WRITERS. A course dealing with the major writers of the early nineteenth century, such as Wordsworth, Coleridge, Byron, Lamb, Shelley, Hazlitt, and Keats. One hour of the week will be devoted to round-table discussion with small groups. 3 rec.; 3 cr.

GRADUATE SCHOOL

63, 64. ADVANCED AMERICAN LITERATURE. A series of studies in special fields, the subjects to be announced. In 1939-40 the subjects are: the American Novel, and the New England Renaissance. 3 rec.; 3 cr.

65, 66. WRITING AS AN ART. A course in the study and practice of writing through an examination of the history of literary criticism. The reading of famous critical essays and of many contemporary opinions, correlated with practice writing of various types. Each student is allowed to spend much of his time with the type he finds most congenial. Collateral reading, with frequent class discussions and conferences.

Prereq.: An advanced course in English composition. 3 rec.; 3 cr. (Given in alternate years; offered 1939-40.)

67, 68. CHAUCER. Chaucer's life and times and a reading of most of his poetry. First semester: Old and Middle English grammar as an introduction to the language of Chaucer. Second semester: *Troilus and Cressida* and the *Canterbury Tales*. 3 rec.; 3 cr.

ENGLISH-EDUCATION (ENG-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL ENGLISH. 2 lec.; 1 lab.; 3 cr.

FRENCH

101, 102. HISTORY OF FRENCH LITERATURE. This course is not an introduction to French literature, but complements what a student has previously learned. The work consists of individual conferences between instructor and student and a large amount of reading. In general, each student is expected to study more carefully the authors of whom he has some knowledge, to fill in the gaps between courses he has taken, and to obtain an integrated knowledge of all French literature. Mr. Parker.

Prereq.: 18 credits in undergraduate courses in French literature. 3 cr.

UNIVERSITY OF NEW HAMPSHIRE

103, 104. SPECIAL STUDIES IN FRENCH LITERATURE. An intensive study of one or two important authors each semester; their lives, works, and times. Molière and Alfred de Vigny, for example, might supply the material for an entire year's work. The particular authors studied, however, may be changed from year to year in accordance with the needs and tastes of the students electing the course. The work will be conducted largely in French. Mr. Grigaut.

Prereq.: 18 credits in undergraduate courses in French literature. 3 cr.

53, 54. FRENCH ROMANTICISM. The period from 1750 to 1850: J. J. Rousseau's work and influence; the important writers of the romantic school in the 19th century; analysis of the intermingling of romanticism and realism in the work of Balzac.

Prereq.: French 12. 3 rec.; 3 cr.

57, 58. FRENCH LITERATURE FROM 1850 TO THE PRESENT. Realism and naturalism in the novel and drama, the Parnassian and symbolist schools in poetry, the psychological novels of Bourget, and the various schools and trends of the late 19th and early 20th centuries. Conducted largely in French.

Prereq.: French 12 or 54. 3 rec.; 3 cr.

61, 62. FRENCH GRAMMAR. A systematic study of French grammar in all its phases from elementary to highly advanced. Intended primarily for those who intend to teach French.

Prereq.: Permission of the instructor or of the head of the department. Permission will be granted only to juniors, seniors, and graduate students. 3 rec.; 3 cr.

63, 64. FRENCH LITERATURE AND CIVILIZATION OF THE MIDDLE AGES AND THE RENAISSANCE. The various forms and masterpieces of French literature from the beginning to the year 1600, with consideration of their historical and social background. Recommended for seniors and graduate students.

Prereq.: French 12 or 54. 2 rec.; 2 cr.

GRADUATE SCHOOL

FRENCH-EDUCATION (FR-Ed) 91. PROBLEMS IN THE TEACHING OF FRENCH IN THE HIGH SCHOOL.

Prereq.: Permission of head of department. 3 rec.; 3 cr.

92. ORAL FRENCH. Accuracy and facility in the use of oral French will be attempted through the study of phonetics and the use of dictation, conversation, the phonograph, the dictaphone and other devices. 2 rec.; 2 cr.

LANGUAGES 51, 52. SURVEY OF MODERN EUROPEAN LITERATURE. The renaissance, classicism, romanticism and realism studied as international movements. Stress will be laid, not upon the details of each national literature, but upon the interdependence of the literatures of the various countries. Literature interpreted as a product of changing patterns of civilization and social ideas. Required reading in the original language or in translations. Conducted in English.

Prereq.: Junior, senior or graduate standing. 3 rec.; 3 cr.

GERMAN

115, 116. HISTORY OF THE GERMAN LANGUAGE. A systematic presentation of the development of the German language from the time of the earliest records to the present, with special emphasis on the historical explanation of living forms. Characteristic works, or parts of them, of all periods will be studied with reference to changes in language and style. Mr. Buffington. 3 rec.; 3 cr.

117, 118. HISTORY OF GERMAN LITERATURE. A survey of German literature from the earliest written monuments to the present day. Representative works will be read and discussed in class, in conjunction with lectures. Mr. Schoolcraft. 3 lec.; 3 cr.

53, 54. GERMAN ROMANTICISM. The revival of the historical and imaginative Middle Ages in the first half of the nineteenth century.

UNIVERSITY OF NEW HAMPSHIRE

Prereq.: Two years of college German or the equivalent. 3 class hours; 3 cr. (Given in alternate years; not offered in 1939-40.)

57, 58. MODERN GERMAN LITERATURE. The development of German literature from 1832 to the present, with special emphasis on the novel and drama. Authors considered are Grillparzer, Hebbel, Ludwig, Keller, Meyer, Wagner, Hauptmann, Sudermann, Thomas Mann, Rilke, George, and Schnitzler.

Prereq.: Two years of college German or the equivalent. 3 class hours; 3 cr. (Given in alternate years; not offered in 1939-40.)

63, 64. HISTORY OF GERMAN LITERATURE. Its development from pagan to modern times. Representative works read in and out of class. The history of German civilization is taken up parallel with the history of literature.

Prereq.: Two years of college German or the equivalent. 3 class hours; 3 cr. (Given in alternate years; not offered in 1939-40.)

LATIN

125, 126. LATIN LITERATURE. A study of Latin literature through the medium of selections from the works of the more important authors from the beginnings to the decline of literary Latin. This reading will be supplemented by a detailed study of some special field, author, or group of authors. Mr. Walsh. 3 rec.; 3 cr. (Not offered in 1939-40.)

51, 52. PHILOSOPHY AND SATIRE. Philosophy, religion, natural science and social theories of the Romans, as exemplified in the writings of Horace, Martial, and Cicero.

Prereq.: Latin 8. 3 rec.; 3 cr. (Given in alternate years; offered in 1939-40.)

55, 56. LITERATURE AND HISTORY. A comprehensive view of Latin literature of the golden age, particularly the works of Caesar, Cicero, and Virgil. Literary value and historical con-

GRADUATE SCHOOL

tent will be studied as well as such background of the history of Rome during the period as is necessary for the student or teacher of the classics.

Prereq.: Latin 8. 3 rec.; 3 cr. (Given in alternate years; not offered in 1939-40.)

63, 64. LATIN COMPOSITION AND TEACHING METHODS. Translation of English narrative, beginning with the fundamentals of grammar and progressing to prose style and effective idiomatic expression. Open to those who have taken or are taking another course in college Latin and recommended for prospective teachers of Latin. 3 rec.; 3 cr.

DIVISION OF PHYSICAL SCIENCES

THOMAS G. PHILLIPS, *Professor of Agricultural and Biological Chemistry*, CHAIRMAN; EDWARD R. ATKINSON, *Assistant Professor of Chemistry*; GEORGE N. BAUER, *Professor of Mathematics*; JOHN W. CALKIN, *Assistant Professor of Mathematics*; DONALD H. CHAPMAN, *Assistant Professor of Geology*; ALBERT F. DAGGETT, *Assistant Professor of Chemistry*; MILTIADES S. DEMOS, *Assistant Professor of Mathematics*; JAMES A. FUNKHOUSER, *Assistant Professor of Chemistry*; GREGORY K. HARTMANN, *Assistant Professor of Physics*; HORACE L. HOWES, *Professor of Physics*; HAROLD A. IDDLIS, *Professor of Chemistry*; CHARLES M. MASON, *Associate Professor of Chemistry*; THEODORE R. MEYERS, *Assistant Professor of Geology*; STANLEY R. SHIMER, *Assistant Professor of Agricultural and Biological Chemistry*; HERMON L. SLOBIN, *Professor of Mathematics*; GEORGE W. WHITE, *Professor of Geology*.

AGRICULTURAL AND BIOLOGICAL CHEMISTRY

Students majoring in this department are expected to have had preparation in the biological sciences, in mathematics, in physics, and in general, analytic and organic chemistry.

101, 102. ADVANCED BIOCHEMISTRY. The preparation, composition and analysis of carbohydrates, fats and proteins. Discussions and laboratory. Mr. Phillips and Mr. Shimer.

UNIVERSITY OF NEW HAMPSHIRE

Prereq.: Satisfactory preparation in analytical, organic and biological chemistry. 4 cr.

103, 104. SPECIAL PROBLEMS. Conferences and library and laboratory work on special phases of chemistry in its relation to agriculture and biology. Mr. Phillips and Mr. Shimer.

Prereq.: Satisfactory preparation in analytical, organic and biological chemistry. Subject matter and credits to be arranged.

51, 52. PHYSIOLOGICAL CHEMISTRY. The chemistry of fats, carbohydrates and proteins, colloids, enzyme action, digestion, metabolism and excretion. The qualitative and quantitative examination of blood and urine.

Prereq.: Satisfactory preparation in organic chemistry and quantitative analysis. 3 lec.; 2 lab.; 5 cr.

53, 54. AGRICULTURAL ANALYSIS. A study of the methods of analysis of soils, fertilizers, feeding stuffs, and other products important in agriculture.

Prereq.: Satisfactory preparation in organic chemistry and quantitative analysis. 1 lec.; 3 lab.; 4 cr.

55. PLANT CHEMISTRY. A study of the chemistry of plant growth and of methods for the analysis of plant materials.

Prereq.: Agricultural chemistry 2. 2 lec.; 2 lab.; 4 cr.

CHEMISTRY

101. ADVANCED QUANTITATIVE ANALYSIS. Physico-Chemical Methods. The lectures discuss analytical procedures involving nephelometry, colorimetry, electrometric titrations, etc. The subjects of buffers, methods of determining pH, use and theory of electrodes for E.M.F. measurements, and electrolytic separations by controlled electrode potential and internal electrolysis are studies. Assigned readings are made in recent publications concerning these and other analytical topics. Mr. Daggett.

Prereq.: Elementary quantitative analysis. 2 rec.; 2 cr.

GRADUATE SCHOOL

102. HISTORY OF CHEMISTRY. A course tracing the growth of chemistry, particularly theories of the science in an historical manner. The course also endeavors to give an insight into the personalities of famous chemists and lays some stress on the better known contemporary chemists and their work. Mr. Funkhouser.

Prereq.: Acceptable courses in organic chemistry.
2 rec.; 2 cr.

111. ORGANIC CHEMISTRY. The chemistry of the polynuclear compounds and heterocyclic systems. Mr. Iddles. 3 rec.; 3 cr.

112. ORGANIC CHEMISTRY. The chemistry of natural products. Mr. Iddles. 3 rec.; 3 cr.

115. ORGANIC CHEMISTRY LABORATORY. QUALITATIVE ANALYSIS. The reactions and properties of organic compounds. Use of group reactions in the identification of organic substances. Mr. Atkinson. 1 rec.; 2 lab.; 3 cr.

116. ORGANIC CHEMISTRY LABORATORY. QUANTITATIVE ANALYSIS. The combustion for carbon and hydrogen, Dumas nitrogen, Kjeldahl nitrogen, estimation of halogens, of sulphur and of organic radicals. The work will include some micro-determinations. Mr. Atkinson. 1 rec.; 2 lab.; 3 cr.

121. PHYSICAL CHEMISTRY. CHEMICAL THERMODYNAMICS. The application of thermodynamics to chemistry. The principles of thermodynamics will be thoroughly reviewed. These principles will be applied in detail to the phase rule, chemical equilibrium, electromotive force, theory of solutions, specific heats and similar topics. Mr. Mason.

Prereq.: One year of physical chemistry. 3 rec.;
3 cr.

122. PHYSICAL CHEMISTRY. CHEMICAL KINETICS. A study of the kinetics of homogeneous and heterogeneous reactions in

UNIVERSITY OF NEW HAMPSHIRE

gaseous and liquid systems, including an introduction to photochemistry. Mr. Daggett.

Prereq.: One year of physical chemistry. 3 lec.;
3 cr.

131, 132. COLLOQUIUM IN ORGANIC CHEMISTRY. The lectures will consider a special field of organic chemistry and will be varied from semester to semester. Mr. Iddles, Mr. Funkhouser, Mr. Atkinson. 1 lec.; 2 cr.

133, 134. COLLOQUIUM IN PHYSICAL CHEMISTRY. The lectures will consider a special field of physical chemistry and will be varied from semester to semester. Mr. Mason and Mr. Daggett. 1 lec.; 2 cr.

141, 142. SEMINAR. Presentation and discussion of recent investigations in the field of chemistry. No credit.

53, 54. ORGANIC CHEMISTRY. Lectures on the chief divisions of organic chemistry; aliphatic and aromatic, with the needs of the pre-professional student in mind. A more detailed consideration of carbohydrates and proteins follows. The laboratory technique of organic chemical methods as illustrated in the preparation and purification of typical organic compounds.

Prereq.: Chemistry 1, 2 and 26 when possible.
3 lec.; 2 lab.; 5 cr. Deposit: Ten dollars for the
year.

55, 56. THEORETICAL PROBLEMS OF MODERN ORGANIC CHEMISTRY. The principles underlying the behavior of organic compounds. A discussion of valence leads to a study of the electron theory of organic chemistry, and this is used as a basis for subsequent discussions of unsaturation, tautomerism, free radicals, color and chemical constitution (including an abbreviated treatment of dyestuffs), polymerization and molecular rearrangements. The latter part of the course includes a study of alicyclic compounds, the physical methods used in investigations of organic compounds, and an extensive study of stereoisomerism. The historical background is emphasized.

Prereq.: Chemistry 48 or 54. 3 lec.; 3 cr.

GRADUATE SCHOOL

71, 72. UNIT PROCESSES. The important inorganic and organic industrial chemical processes from the point of view of the basic chemical reactions and physical operations involved.

Prereq.: Chemistry 22. 2 lec.; 2 cr.

74, 75. UNIT OPERATIONS. The theory and practice of the fundamental chemical engineering unit operations, including flow of fluids, flow of heat, evaporation, distillation, drying, filtration, gas absorption, extraction, humidification and air conditioning, crystallization, crushing and grinding, and size separation.

Prereq.: Chemistry 71, 83. 3 lec.; 3 cr.

83, 84. PHYSICAL CHEMISTRY. The properties of gases, liquids and solids; principles of thermodynamics and applications; solutions, ionic theory, chemical equilibria, thermochemistry, conductance and electromotive force; principles of kinetics and their application to reaction rates. The laboratory will include accurate measurements illustrating the principles studied in the lectures.

Prereq.: Chemistry 22, mathematics 8, physics 8.
3 lec.; 2 lab.; 5 cr. Deposit: Ten dollars for the year.

85, 86. ADVANCED PHYSICAL AND INORGANIC CHEMISTRY. The structure and properties of matter as developed from studies of radio-activity, atomic structure, crystal structure and related topics; a complete review of elementary physical chemistry and some supplementary topics.

Prereq.: Chemistry 84 or equivalent. 2 lec.; 2 cr.

GEOLOGY

Students majoring in this department are expected to have had preparation in physical, historical and structural geology, mineralogy, mathematics and chemistry.

Southern New Hampshire presents many attractive geologic problems, especially in the fields of physiographic, glacial, structural, metamorphic, and igneous geology.

UNIVERSITY OF NEW HAMPSHIRE

101, 102. GLACIAL GEOLOGY. A detailed study of glacial geology, principally of North America, with special emphasis on New England. Mr. White and Mr. Chapman.

Prerequisites: Courses in physical geology and physiography. 2 rec.; 2 lab.; 4 semester credits.

103, 104. OPTICAL CRYSTALLOGRAPHY AND PETROGRAPHY. A study of minerals and rocks in powder and in thin sections by means of the petrographic microscope. Mr. Meyers.

Prerequisites: Courses in mineralogy and physics. 1 rec.; 2 lab.; 3 cr.

105, 106. RESEARCH. * Work on special problems.

Geomorphology—Mr. White.

Glacial Geology—Mr. White and Mr. Chapman.

Areal Geology and Petrography—Mr. Meyers.

Prereq.: Special permission. Credits to be arranged.

51, 52. MINERALOGY. The minerals that make up the earth's crust: crystals; minerals and their determination by means of physical characteristics; and the aggregation of minerals to form rocks.

Prereq.: One course in geology and one course in chemistry. Geology 51 prerequisite for 52. 2 lec. or rec.; 1 lab.; 3 cr.

53, 54. ECONOMIC GEOLOGY. First semester: the types of coal and their occurrence in the United States; petroleum, the structures in which it is found, and the distribution and geology of oil fields, especially in the United States; cement materials, building stones and related materials. Second semester: the metals, their ores, and the geology of important ore deposits.

Prereq.: One year's work in geology. 3 lec. or rec.; 3 cr. (Given in alternate years; not offered in 1939-40.)

55, 56. PALEONTOLOGY. The history, development and morphology of the various groups of animals and, to a lesser

GRADUATE SCHOOL

extent, plants, as recorded by fossils found in the rocks of the earth's crust.

Prereq.: One year's work in geology or zoölogy.

55 prerequisite for 56. 2 lec. or rec.; 1 lab.; 3 cr.

(Given in alternate years; offered in 1939-40.)

57, 58. GEOLOGIC PROBLEMS. Special problems by means of conferences, assigned readings and field work, fitted to individual needs.

Prereq.: Permission of the instructor. Credits to be arranged.

71. HUMAN GEOGRAPHY. The surface of the earth as the home of man. Relation of the physical geographic characteristics of plain, plateau, and mountain regions to their use by man; their varying effect on human activities because of latitude, altitude, weather, structure, and other geographic factors. Wall maps, topographic and geologic maps, atlases, lantern slides, and a well selected library will be available for reference purposes. One 2-hour rec.; 2 cr.

72. GEOGRAPHY OF NORTH AMERICA. The physiography of the continent and its natural divisions in relation to climate, structure and political divisions. Particular emphasis on New England and the United States, but Canada and New Mexico are also studied. Maps, references, and lantern slides supplement the class discussion. One 2-hour rec.; 2 cr.

MATHEMATICS

101, 102. COMPLEX VARIABLE. The theory of analytic functions of a single complex variable by the methods of Cauchy (integrals), Riemann (derivatives) and Weierstrass (series), conformal mapping and Riemann's surfaces, and the elementary theory of elliptic functions. Mr. Demos.

Prereq.: Mathematics 8. 3 cr.

103, 104. FUNCTIONS OF A REAL VARIABLE. The subject matter of this course may vary from year to year, but the following subjects will always be treated: the real number system,

UNIVERSITY OF NEW HAMPSHIRE

the theory of point sets, Lebesgue integration, the Riesz-Fischer theorem, functions of bounded variation. Mr. Calkin.

Prereq.: Mathematics 8. 3 cr.

105, 106. EDUCATIONAL STATISTICS. A study of the statistical methods dealing with data pertaining to problems in education. The topics to be considered include central tendency, dispersion, linear correlation, non-linear correlation, partial and multiple correlation, the normal probability curve, curve fitting, sampling, and estimation. In considering the several problems, emphasis will be placed on theory and on application to concrete numerical data. Mr. Bauer.

Prereq.: Mathematics 41, 42. 3 rec.; 3 cr.

107, 108. INFINITE SERIES AND PRODUCTS. This course includes selections from the following topics: theories of irrationals; series of positive terms; convergence tests; general series; double series; transformation of series; infinite products; Fourier, Dirichlet and power series; special series; divergent series. Mr. Slobin.

Prereq.: Mathematics 8. 3 cr.

51, 52. ADVANCED CALCULUS, DIFFERENTIAL EQUATIONS, VECTOR ANALYSIS AND THEIR APPLICATION TO ENGINEERING PROBLEMS.

Prereq.: Mathematics 8. 3 rec.; 3 cr.

53, 54. ECONOMIC AND SOCIAL STATISTICS. A continuation of mathematics 41, 42 including a more thorough study of correlation, multiple and partial correlation, time series including trend and seasonal variation and cycles. Material selected to meet best the needs of advanced students in social science, economics and education and to throw light on statistical research methods used in these fields.

Prereq.: Mathematics 41, 42. 3 rec.; 3 cr.

55, 56. ADVANCED PLANE AND SOLID ANALYTICAL GEOMETRY.

Prereq.: Mathematics 8. 3 rec.; 3 cr. (Given in 1939-40 and thereafter in alternate years.)

GRADUATE SCHOOL

57. THE HISTORY OF MATHEMATICS. Designed especially for those preparing to teach mathematics in high school. An historical background and an appreciation of the development of various fields of mathematics.

Prereq.: Mathematics 7. 3 rec.; 3 cr.

71, 72. ADVANCED ALGEBRA. Matrix theory, including elementary divisors and invariant factors; linear transformations; quadratic bilinear, and Hermitian forms; invariants and covariants with geometric applications; and topics from the theory of equations, including symmetric functions, and groups of substitutions.

Prereq.: Mathematics 8. 3 rec.; 3 cr. (Given in alternate years. Not offered in 1939-40.)

MATHEMATICS-EDUCATION (MATH-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL MATHEMATICS. 3 rec.; 3 cr.

PHYSICS

101, 102. MODERN PHYSICS. A course of lectures with accompanying problems and outside reading. An attempt will be made to adapt the course to the needs of students in chemistry, geology and mathematics. Mr. Hartmann.

Prereq.: Physics 7, 8, 51, 52, or the equivalent. 3 lec.; 3 cr.

104. LUMINESCENT RADIATION. Lectures descriptive of experimental researches in the luminescence of solids; with some attention to the luminescence of gases, and non-blackbody radiation in general. Mr. Howes.

Prereq.: Physics 7, 8, 9, 10, 14 or the equivalent. 3 lec.; 3 cr.

51. THEORY OF ELECTRONS. The theory of electricity including the passage of a current through a gas, the mobility of ions, the determination of charge and mass of the electron, ionization by collision, the corona discharge, cathode rays, positive rays, thermionic emission, photo-electricity and X-rays.

Prereq.: Physics 7, 8; mathematics 7, 8. 2 lec.; 2 cr.

UNIVERSITY OF NEW HAMPSHIRE

52. ELECTRICAL MEASUREMENTS. Experiments on the use of precision potentiometers, the constants of sensitive galvanometers, time tests of batteries, low resistance by the Kelvin double bridge, high resistance by the method of leakage, the use of alternating current bridges for measuring capacity, self and mutual inductance and frequency, the characteristics of various types of photo-electric cells, and the Millikan oil-drop experiment.

Prereq.: Physics 8 and 10. 1 lec.; 1 lab.; 3 cr.

54. ACOUSTICS. The principles of sound origins, propagation, and reception. Lectures and recitations.

Prereq.: Physics 8 and 10. 3 lec.; 3 cr.

DIVISION OF SOCIAL STUDIES

HARRY C. WOODWORTH, *Professor of Agricultural Economics*, CHAIRMAN; NORMAN ALEXANDER, *Associate Professor of Economics*; DONALD C. BABCOCK, *Professor of History*; JOSEPH E. BACHELDER, JR., *Assistant Professor of Sociology*; CHARLES W. COULTER, *Professor of Sociology*; CARROLL M. DEGLER, *Assistant Professor of Economics*; HAROLD C. GRINNELL, *Assistant Professor of Agricultural Economics*; LASHLEY G. HARVEY, *Assistant Professor of Government*; GIBSON R. JOHNSON, *Assistant Professor of History*; THORSTEN V. KALIJARVI, *Professor of Government*; ALAN G. MACLEOD, *Assistant Professor of Agricultural Economics*; PHILIP M. MARSTON, *Assistant Professor of History*; HERBERT F. RUDD, *Professor of Philosophy*; HARRY W. SMITH, *Professor of Economics*; CLAIR W. SWONGER, *Assistant Professor of Economics*; RUTH J. WOODRUFF, *Associate Professor of Economics*.

REQUIREMENTS FOR ADMISSION TO CANDIDACY

The candidate for admission who intends to do work in the general field of the social studies should qualify to take advanced work in three of the fields of work within the division. To qualify to take advanced work in a field is generally interpreted to mean that the candidate has had one year's work with an average record of 75 in the field as an undergraduate student or its equivalent.

GRADUATE SCHOOL

The candidate for admission who intends to do work in a special field (agricultural economics, economics, government, history or sociology) shall be admitted by agreement between the dean of the Graduate school, the chairman of the division and the head of the department in which the major is to be taken. The candidate for admission should qualify to do advanced work in the special field chosen. This is generally interpreted to mean that the candidate has had not less than two years' work with an average record of 75 in the special field or its equivalent and one year's work in another field in this division or its equivalent. However, it is highly desirable that the candidate complete three years' work in the special field before being admitted to candidacy.

REQUIREMENTS FOR MASTER OF ARTS DEGREE

Additional requirements for the master of arts degree in a social study:

A minimum of 18 and a maximum of 24 credits, including the thesis, in the major field.

A thesis carrying from 3 to 10 credits.

An oral examination on the thesis may be required at the discretion of the department.

Additional requirements for the master of arts degree in social studies:

A thesis carrying from 3 to 6 credits on which an oral examination may be required at the discretion of the departments concerned.

A minimum of 12 and a maximum of 15 credits, including the thesis, in a major field, of which at least six credits must be in courses primarily for graduate students (numbered 101 to 200 or thesis).

Of the remaining credits, at least three must be from each of two of the other three fields and of these remaining credits, at least three must be in courses primarily for graduate students (numbered 101 to 200).

By vote of the heads of the departments in which the student is offering work for the degree, a written comprehen-

UNIVERSITY OF NEW HAMPSHIRE

sive examination may be substituted for the thesis, but in such cases the credits allotted for the thesis must be made up by courses. The field or fields of the written comprehensive examination will be agreed upon by the adviser and the candidate before February 1 preceding that June in which the degree is to be taken. The examination will be given during the second week preceding the beginning of final course examinations in the spring semester.

If an oral examination is required, it will be given by a committee appointed by the head of the department with the approval of the chairman of the division.

AGRICULTURAL ECONOMICS

In each of the three seminar courses listed below the needs and interests of each student will be appraised and the readings and conferences will be scheduled accordingly. This schedule may bring the student in contact with several members of the staff.

101, 102. SEMINAR IN ADVANCED FARM MANAGEMENT. Principles and problems of farm management as applied to the organization and operation of individual farms. Mr. Grinnell. 3 cr.

103, 104. SEMINAR IN AGRICULTURAL PRICES. The history of agricultural prices and the major factors determining prices. Methods of price analysis. Assigned readings and conferences. Mr. MacLeod. 3 cr.

105, 106. SEMINAR IN LAND UTILIZATION AND AGRICULTURAL POLICY. An appraisal of national and local policies and proposed action programs affecting American agriculture. Assigned readings and conferences. Mr. Woodworth. 3 cr.

51, 52. SPECIAL AGRICULTURAL ECONOMICS. Graduate or undergraduate credit to satisfy a student's needs may be obtained in this course in special cases by permission of the head of the department. Hours of meeting and number of credits to be arranged.

GRADUATE SCHOOL

ECONOMICS

101, 102. SEMINAR IN ECONOMIC INVESTIGATION. This course is open to election by graduate students only. In this course students may choose to pursue research on special problems in the fields of labor and public finance. Personal conferences, occasional lectures, reports, and thesis. Mr. Smith.

Prereq.: Graduate standing in economics. 3 cr.

103, 104. PROBLEMS IN AMERICAN ECONOMIC HISTORY. This course is intended for graduate students who wish to present a thesis on a topic in American economic history. The course will be conducted by conference and will include training in research methods. The use of primary source material will be stressed. Miss Woodruff. 3 cr.

106. PUBLIC ADMINISTRATION AND BUSINESS. A study of the various administrative agencies established by the state and federal governments for the regulation of business. Special attention will be given to the economic and legal problems of the control of business by commissions as exemplified by recent federal legislation. Mr. Alexander.

Prereq.: Economics 23. 3 cr.

107, 108. CURRENT MONETARY PROBLEMS. Recent developments of monetary theory and practice. Such problems may be examined as the monetary standard; credit control; central banking; commercial banking; the relations of government to the monetary system. Guided reading, conferences, and reports. Mr. Swonger.

Prereq.: Two years' work in economics, including at least one year's work in principles or theory. 3 cr.

110, 111. PROBLEMS OF CORPORATIONS. This course is intended to give the properly qualified graduate student an opportunity to pursue his interests in the field of corporations. The topics included for study are corporate organization, combinations, the corporation as a social institution, corporate fi-

UNIVERSITY OF NEW HAMPSHIRE

nancial problems, and the governmental regulation of corporations. The course will be conducted entirely by conference and the student will be largely on his own under the guidance of the instructor. Frequent reports on progress and a final written report are required. Attention to sound methods of research will be stressed. Mr. Degler.

Prereq.: Two years' work in economics including at least one year's work in principles or theory.

51. LABOR PROBLEMS. Historical background and present status of labor organization and problems.

Prereq.: Economics 2. 3 lec. or rec.; 3 cr.

52. PUBLIC FINANCE. Theory and practice of public expenditures and collection of public revenues; changed tendencies and policies in taxation reform; taxation problems in the state of New Hampshire.

Prereq.: A satisfactory average in 12 semester credits in economics. 3 lec. or rec.; 3 cr.

53, 54. MONEY AND BANKING. Theory and practice of money and banking.

Prereq.: Economics 2. Economics 53 prerequisite for 54. 3 lec. or rec.; 3 cr.

55. CORPORATIONS. Development and forms of business organizations and combination.

Prereq.: Economics 2. 3 lec. or rec.; 3 cr.

56. CORPORATION FINANCE. Methods of financing corporate enterprise.

Prereq.: Economics 55. 3 lec. or rec.; 3 cr.

57, 58. HISTORY OF ECONOMICS. A critical account of the development of economic thought in the leading nations of the western world; the economic systems of Greece, Rome, medieval and modern Europe, including the manorial, guild, mercantile, kameralistic, physiocratic, laissez faire, classical, historical and socialistic systems; and the important relations of economic philosophy to historical, political and social environment.

GRADUATE SCHOOL

Prereq.: A satisfactory average in 12 semester credits in economics. 3 lec. or rec.; 3 cr.

59, 60. SEMINAR IN CURRENT ECONOMIC PROBLEMS.

Recitations and reports; 3 cr.

GOVERNMENT

101, 102. INTERNESHIPS. A limited number of graduate students will be appointed each year by the department of government to serve in some department of the state or local government. The work of the student during this period will count toward a master's degree in the social studies. If consistent with the internship, and it is possible for the interne to visit the campus once a week, he may take special seminar work not to exceed five credits. Details will be arranged individually in each case, and all work off the campus will be closely supervised. Mr. Kalijarvi.

Open only to graduate students. Credits not to exceed 10 semester hours per semester.

103, 104. SEMINAR IN PUBLIC ADMINISTRATION. This course is concerned with administrative techniques and procedure and deals with budgetary process, personnel direction, administrative organization and management, public reporting, controls standards of administrative effectiveness, the interrelations of local, state, and federal governments along functional lines and comparative material drawn from administrative procedure abroad. Mr. Kalijarvi, Mr. Harvey. 1 rec.; 3 cr.

51. CONSTITUTIONAL LAW. The case study of the constitutional development of the United States in terms of supreme, federal and state court decisions.

Prereq.: One year's work in government. 3 lec. or rec.; 3 cr.

52. INTRODUCTION TO JURISPRUDENCE. Generalized principles of law and legal institutions. The law as an institution of social and political control.

UNIVERSITY OF NEW HAMPSHIRE

Prereq.: Government 7 or 8 or 51. 3 lec. or rec.;
3 cr. (Given in alternate years; offered in 1939-40.)

53, 54. **POLITICAL THEORY.** A reading course in the classics of political thought: Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, Burke, Paine, Adam Smith, Ricardo, Bentham, Marx, and others. Analysis of the political philosophy of the several 19th century schools. A philosophical approach to modern political problems.

Prereq.: Two years' work in government. 3 lec. or rec.; 3 cr.

55, 56. **INTERNATIONAL RELATIONS AND WORLD GOVERNMENT.** The forms of international organizations and world politics. The rise of the modern nations and their relation to each other. The international world in which we live.

Prereq.: Two years' work in government. 3 lec. or rec.; 3 cr.

58. **PUBLIC ADMINISTRATION.** The administration of modern states: administrative law; public relations; personnel; financial administration; governmental reporting; staff functions; public health; welfare; judicial administration; conservation of natural resources; government in business; government promotion of commerce and industry; and the construction of public works.

Prereq.: Government 3, 4 or equivalent. 3 lec.;
3 cr. (Given in alternate years; not offered in 1939-40.)

59. **THE GOVERNMENT OF THE STATE OF NEW HAMPSHIRE.** Since the General Court passed its recent legislation requiring the instruction of children in elementary and secondary schools in the subject of the constitution of the state of New Hampshire, many teachers and students have found greater need for information about their state government. This course is designed to meet that desire. The constitutions of the state and incidentally of the federal government will be used as the bases

GRADUATE SCHOOL

for instruction. A rounded out picture of the state government, its organization, functions and problems. One 2-hour rec.; 2 cr.

60. THE CONTEMPORARY AMERICAN POLITICAL SCENE. For teachers of civics and for those who wish to keep abreast of current political developments in the United States. The adoption of new and the abandonment of old governmental machinery, programs, and policies make a review of our government and its manifold problems desirable. The decisions of the federal supreme court, legislation since 1932, the growing demand for better personnel in government, contemplated government reforms, trade agreements, the new position of labor, and other similar topics will be discussed. Students will be required to subscribe to a large metropolitan newspaper. One 2-hour rec.; 2 cr.

63, 64. SEMINAR. Papers on assigned topics, and reports under the guidance of the department head.

Prereq.: Government 63 prerequisite for 64.

HISTORY

101, 102. SEMINAR IN PHILOSOPHY OF HISTORY. This course gives opportunity to investigate some of the topics that cannot be followed very far in such courses as history 55, 56 (philosophy of history), history 67, 68 (historical geography and biography), and other special fields. Mr. Babcock.

Prereq.: Permission of the instructor. Hours and credits to be arranged.

110, 111. SEMINAR IN THE HISTORY OF NEW ENGLAND. For graduate students who wish to specialize in some phase of New England history or the history of New Hampshire. The work is concerned primarily with the study and interpretation of source material and can be correlated with the preparation of a thesis. Only students who are especially well prepared should attempt the work. Elective by permission of the instructor. Mr. Marston. Hours and credits to be arranged.

UNIVERSITY OF NEW HAMPSHIRE

120, 121. SEMINAR IN THE HISTORY OF RELIGIONS. An investigation of the origin and development of primitive religion. The nature of religion as indicated by its historic manifestations. One or more of the living religions will be selected for special study. Opportunity will be given for individual investigation of topics. Mr. Johnson.

Prereq.: Permission of the instructor. Hours and credits to be arranged.

PHILOSOPHY 101, 102. PROBLEMS IN PHILOSOPHY: SEMINAR. A study of special problems by means of conferences, assigned readings and term papers. The study of recent philosophical writings provides a great variety of materials for this course. Students are admitted only by special permission. Hours and credits to be arranged.

51, 52. COLONIAL AND REVOLUTIONARY AMERICAN HISTORY. Colonial beginnings in America, national rivalries, the English colonies, the Revolution, and our national life to 1789. Early forms of Americanism in the making.

Prereq.: History 51 prerequisite for 52. 3 lec. or rec.; 3 cr. (Given in alternate years; offered in 1939-40.)

53. HISTORY OF CIVILIZATION. Designed to show the close connections between the historical development of western society in both Europe and North America and their educational institutions. The development of education from the ancient Orient, Greece, Rome, the Middle Ages, to modern times. Modern educational institutions in Europe and the United States connected with 19th and 20th century developments. 3 lec. or rec.; 3 cr.

55, 56. THE PHILOSOPHY OF HISTORY. (1) Chronology and periodizing, and teaching methods having to do with dates. (2) Culture-history, including the historical side of everyday things. (3) The philosophy-of-history proper, or a study of some of the ways in which thoughtful persons have interpreted the nature of history as a whole. 2 lec. or discussions; 2 cr. (Given in alternate years; offered in 1939-40.)

GRADUATE SCHOOL

59, 60. SOCIAL AND CULTURAL HISTORY OF NEW ENGLAND. From the settlements to the present. The material and intellectual aspects peculiar to New England's social and cultural life. The viewpoint is partly that of the antiquarian. Source materials figure considerably. It is assumed that the student is familiar with the general history of New England.

Prereq.: History 59 prerequisite for 60. 3 lec. or rec.; 3 cr. (Given in alternate years; not offered in 1939-40.)

61, 62. THE WORLD WAR. The 19th and 20th century background and causes for the world war; the military, political, economic and social developments during the course of the war; the Paris peace conference. 3 lec. or rec.; 3 cr.

63, 64. RECENT WORLD HISTORY. The post-war world, exclusive, for the most part, of American affairs, and stressing the historical developments in Europe, the Near and Far East. 3 lec. or rec.; 3 cr.

65, 66. RECENT AND CONTEMPORARY AMERICAN HISTORY. Developments in American life since the world war. The reaction of our individualism in the presence of new world ideologies, and the extent of its modification. A close range observation of social history in the making. Current newspapers and periodicals will be used. 2 lec., rec., or discussions. 2 cr.

67, 68. HISTORICAL GEOGRAPHY AND BIOGRAPHY. Schools of thought in history are likely to be either environmental or personal; that is, either deterministic or voluntaristic. This course devotes a semester to each way of thinking, reviewed in the light of concrete data. New applications and methods of study and teaching. First semester: the use of maps, and map-making for classrooms. Second semester: the study of representative, as distinguished from great, persons. 2 lec. or discussions; 2 cr. (Given in alternate years; not offered in 1939-40.)

HISTORY-EDUCATION (HIST-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL HISTORY. 3 class meetings; 2 cr.

UNIVERSITY OF NEW HAMPSHIRE

HISTORY-EDUCATION (HIST-ED) 92. PRACTICUM IN THE TEACHING OF HISTORY IN HIGH SCHOOLS. One 2-hour rec.; 2 cr.

PHILOSOPHY 51. ART OF THINKING: LOGIC. The many factors which determine the quality of human thinking as trustworthy or untrustworthy; the aids to better thinking practices. 3 lec. or rec.; 3 cr.

PHILOSOPHY 81, 82. HISTORICAL INTRODUCTION TO PHILOSOPHY. Two objectives are approached simultaneously: (1) an understanding of the succession of philosophic systems and the great philosophers who projected them, from the beginning of Greek philosophy to the present; (2) a systematic survey of the persistent problems of life as philosophers have seen them, and of the types of philosophic world-view that have contested for acceptance. 3 lec. or rec.; 3 cr. (Given in alternate years; offered in 1939-40.)

PHILOSOPHY 83, 84. THE EVOLUTION OF SOCIAL VALUES AND ETHICAL JUDGMENTS. The development of biological, psychological and social capacities which are essential to the appearance of any community values; the moral significance of early group life; the economic and cultural factors which shape value systems; the divergent patterns of moral sentiment in advanced civilizations; possible standards of judging folkways and ethical assumptions. Second semester: an analysis of the factors which bring personal and social crises in the present generation; and the ideals, principles, and programs which may successfully meet these problems. 3 lec. or rec.; 3 cr. (Given in alternate years; not offered in 1939-40.)

SOCIOLOGY

105, 106. SOCIOLOGICAL SEMINAR. A course designed for graduate students dealing with specialized topics which will be varied from year to year and include social ecology, social trends, analysis of contemporary systems of sociological thought and comparative adjustment theories. Admission with consent of instructor. Mr. Coulter and Mr. Bachelder. 3 cr.

GRADUATE SCHOOL

53. CULTURAL ANTHROPOLOGY AND ETHNOLOGY. (1) A comparative study of primitive folkways, institutions and social organization, marriage, economic activities, religion, property inheritance and folklore; culture and the principles of its development; the significance of primitive culture for an understanding of contemporary civilization. (2) A comparative study of peoples; environmental factors; societal effect of invasion, colonization and linguistic fusions; race and class struggles; jingoism; race relations in mid-European territory and in the Far East; the problems of world peace.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

54. THE IMMIGRANT AND THE NEGRO. Negro and immigrant heritage; problems of assimilation and Americanization. Intensive study of groups, the Negro, the Jew, the Italian, the Pole, the Greek, the French-Canadian and the Japanese.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

57. RURAL SOCIOLOGY. The foundation materials of rural life; the physical setting—land, land policies, land tenure; land economics; farm and village population—its composition, its changes; the income basis of rural life, the standard of living; rural habits, attitudes; rural groupings, arrangements, the mechanisms of communication and social control; rural institutions with respect to welfare, sociability, education and religion.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

60. URBAN SOCIOLOGY. The changes in community life that have come with the shift of population from rural districts; factors involved in the rapid growth of cities since 1800; physical structure of the city, processes of internal growth; the segregation which makes a city a mosaic of distinct cultural worlds; increase in mobility which multiplies social stimuli; typical areas within the city—foreign colonies, rooming house districts, apartment and hotel areas, outlying areas of homes; the effect of the city upon community life, the family, church, school, unorganized group behavior, attitudes and life organization of the person.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

UNIVERSITY OF NEW HAMPSHIRE

61. **SOCIAL PATHOLOGY.** Personal, institutional and community disorganization. The social factors involved in alcoholism, drug addiction, prostitution, poverty, vagrancy, juvenile and adult delinquency, divorce and desertion; instances of the break-down of public opinion and of community, family, religious and legal sanctions as forces for social control. Remedial measures based upon a discussion of human nature and the physical conditions of modern life. Especially recommended for pre-medical, pre-legal, and other students who will be handling social variants in the field of their professions.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

62. **COMMUNITY ORGANIZATION.** Town and country community organization with respect to natural and interest groupings; the survey; methods of analyzing problems of community organization; methods of utilizing institutions and equipment in the development of programs and organization for health, recreation, general welfare and control.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

71. **CRIME AND ITS SOCIAL TREATMENT.** The increase, extent and more popular theories of crime and delinquency, juvenile and adult. Case studies of individual delinquents with special reference to the influence of family and neighborhood environments; typical social situations and their influence; programs for social treatment of crime, the reorganization of reformatory institutions, classification of offenders for separate treatment, the "honor system," limited self-government, parole and probation, and the juvenile court as agencies for the prevention of delinquency.

Prereq.: Sociology 1 and 2. 3 lec.; 3 cr.

72. **THE FAMILY.** The rise of the marriage institution and the family. Divorce, desertion, changing status of women, child welfare, child labor laws, and related modern problems.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

75. **METHODS OF SOCIAL RESEARCH.** The application of the historical, survey, statistical and case methods to social data;

GRADUATE SCHOOL

the use of bibliography, definition and selection of the problem, determination of the data needed, collection and arrangement of data for presentation and exposition.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

76. **PRINCIPLES OF SOCIAL CASE WORK.** The present trend in family case work; the techniques of interviewing, diagnosis, treatment and case recording; the significance of present-day relief practices.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

84. **METHODS OF SOCIAL PROGRESS.** Efforts to improve social conditions and attain a larger measure of social justice; community experiments; development of modern social legislation; application of principles of insurance to social problems; various forms of mutual aid and philanthropy; endowments and special foundations.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

87. **THE CHURCH IN AMERICAN SOCIETY.** Contemporary organizations for worship in the community, their correlation, functions, and problems; the rise of the church and its relation to labor, the state, school, social welfare agencies; significance to the community of its organization and financing; church federation and union.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

(Not offered in 1939-40.)

88. **RECREATION AND LEISURE.** Problems arising from the increase of leisure time in modern society; typical leisure time activities; theories of play; practical training programs in recreation; the function of leadership; analysis of types and qualities of leadership as exhibited by typical leaders; the material and program of leadership training.

Prereq.: Sociology 1 and 2. 3 lec. or rec.; 3 cr.

89, 90. **DEVELOPMENT OF SOCIOLOGICAL THOUGHT.** The history of sociological thought, with special reference to the writings of Comte, Spencer and the later writers of the nineteenth century; a comparison of contemporary sociological systems.

UNIVERSITY OF NEW HAMPSHIRE

Prereq.: Sociology 1 and 2. Sociology 89 prerequisite for 90. 3 lec. or rec.; 3 cr. (Not offered in 1939-40.)

95, 96. SOCIOLOGICAL RESEARCH. A seminar for conference and reports on research projects arranged for graduates and seniors who have completed major work in sociology. General topic first semester, social control; second semester, social legislation.

Prereq.: Sociology 75 and 84. 3 meetings; 3 cr.

97, 98. SOCIAL SERVICE AND FIELD WORK. Designed to give the student practical experience in social work. Field work in connection with neighboring social agencies, supplemented by readings, lectures and conferences.

Prereq.: 12 credits in sociology. The course may be taken during the college year for 3 credits each semester, or during the summer in connection with certain approved settlements, correctional institutions, or case work agencies. Eight weeks' summer residence with an agency is required, for which a maximum of 6 credits is given.

ADVANCED DEGREES, 1939

MASTER OF ARTS

IN ENGLISH:

| | |
|---|--------------------|
| Florence Grace Crosby | Enfield, N. H. |
| B.A., University of New Hampshire, 1938 | |
| Robert Wilson Kidder | Laconia, N. H. |
| B.A., University of New Hampshire, 1938 | |
| Eileen Rita McLaughlin | Laconia, N. H. |
| B.A., University of New Hampshire, 1937 | |
| Marjorie Groah Thompson | Somersworth, N. H. |
| B.A., University of New Hampshire, 1925 | |

IN HISTORY:

| | |
|---|----------------------|
| Ethel Etta Kelley | So. Deerfield, N. H. |
| B.A., University of New Hampshire, 1927 | |

GRADUATE SCHOOL

IN LANGUAGES:

| | |
|---|-------------------|
| Lucille Louise Lamoureux | Gardner, Mass. |
| A.B., Regis college, 1936 | |
| Dorothy Adelaide Spence | Berwick, Maine |
| B.A., University of New Hampshire, 1931 | |
| Fannie Mae Spinney | Dover, N. H. |
| B.A., University of New Hampshire, 1922 | |
| Marguerite Eugénie Wagoneer | Manchester, N. H. |
| B.Ed., Plymouth Normal school, 1932 | |

IN SOCIAL STUDIES:

| | |
|---|-------------------|
| Elmer Vincent Andrews | Dover, N. H. |
| B.S., University of New Hampshire, 1938 | |
| James Francis Burke | Manchester, N. H. |
| A.B., St. Anselm's college, 1938 | |
| John Joseph Conroy | Durham, N. H. |
| B.A., University of New Hampshire, 1932 | |
| Ruth Conant Delpino | New Castle, N. H. |
| A.B., Bates college, 1929 | |
| Helen Elizabeth Foss | Rochester, N. H. |
| A.B., Bates college, 1927 | |
| Frederick Augustus Hayes | Penacook, N. H. |
| B.D., Bangor Theological seminary, 1938 | |
| Ernest Marshall Perkins | Newport, N. H. |
| B.S., University of New Hampshire, 1930 | |

MASTER OF EDUCATION

| | |
|---|-------------------|
| Philip Shaw Barton | No. Weare, N. H. |
| B.S., University of New Hampshire, 1928 | |
| Wendell Farrar Bennett | Kingston, N. H. |
| B.S., University of New Hampshire, 1938 | |
| Frank Henry Blackington, Jr. | Keene, N. H. |
| A.B., Bates college, 1921 | |
| Abraham Bloom | Providence, R. I. |
| B.S., Rhode Island college, 1934 | |
| Charles Davies Dalzell | Walpole, N. H. |
| B.S., Rhode Island State college, 1919 | |
| Chester Maurice Gray | Contoocook, N. H. |
| A.B., Dartmouth college, 1928 | |
| Leslie Osborn Griffiths | Berwick, Maine |
| B.S., University of New Hampshire, 1938 | |
| Hazel Louise Gupstill | Berwick, Maine |
| A.B., Bates college, 1931 | |

UNIVERSITY OF NEW HAMPSHIRE

| | |
|--|----------------------|
| Byron Lynn Harriman | Warner, N. H. |
| B.A., University of New Hampshire, 1938 | |
| Edna Linnéa Johnson | Hillsboro, N. H. |
| B.E., Keene Normal school, 1932 | |
| William Dudley Johnson | West Newbury, Mass. |
| B.S., University of New Hampshire, 1925 | |
| Marguerite Marie Kelleher | Providence, R. I. |
| B.Ed., Rhode Island college of Education, 1936 | |
| Albion Keith Littlefield | No. Berwick, Maine |
| B.S., Colby college, 1929 | |
| Lucius Vanderburg Lobdell | Norwalk, Conn. |
| B.S., Colby college, 1931 | |
| Charles Edward Lord | Laconia, N. H. |
| B.S., University of New Hampshire, 1923 | |
| Richard Abbott Martin | Pittsburg, N. H. |
| B.A., University of New Hampshire, 1934 | |
| Howard Francis Mason | Lincoln, N. H. |
| B.A., Dartmouth college, 1931 | |
| Earle William Moody | Orange, Mass. |
| B.S., Norwich university, 1929 | |
| Peter Joseph Murphy | Dover, N. H. |
| B.S., University of New Hampshire, 1938 | |
| John Roy Newton | Henniker, N. H. |
| A.B., Yale university, 1932 | |
| Roland Laurence Simmons | Durham, N. H. |
| A.B., University of Wichita, 1933 | |
| Eugene Thomas Smith | No. Stratford, N. H. |
| B.S., University of New Hampshire, 1932 | |
| Gertrude May Trickey | Alton Bay, N. H. |
| B.S., University of New Hampshire, 1937 | |

MASTER OF SCIENCE

IN AGRICULTURAL AND BIOLOGICAL CHEMISTRY:

| | |
|--|--------------------|
| Willard Stover Breon | St. College, Penn. |
| B.S., Pennsylvania State college, 1937 | |
| Elwood Clifton Pierce | Warren, Ohio |
| B.Sc., Ohio State university, 1937 | |

IN BOTANY AND BACTERIOLOGY:

| | |
|--|---------------|
| Helen Patricia MacLeod | Durham, N. H. |
| B.S.P., University of Saskatchewan, 1928 | |

GRADUATE SCHOOL

IN CHEMISTRY:

- | | |
|---|-----------------------|
| Walter Hodgkins Bailey | Durham, N. H. |
| A.B., Harvard university, 1937 | |
| Joseph William Hickey | East Rochester, N. H. |
| B.S., University of New Hampshire, 1937 | |
| Edward Francis Mellon | Niagara Falls, N. Y. |
| A.B., Allegheny college, 1937 | |
| Wendell Holmes Powers | Richford, Vt. |
| B.S., Middlebury college, 1937 | |
| Herbert Ernest Silcox | Durham, N. H. |
| B.S., University of New Hampshire, 1936 | |
| Dwayne Trowbridge Vier | Dover, N. H. |
| B.S., University of New Hampshire, 1937 | |

IN ENTOMOLOGY:

- | | |
|--|------------------|
| Robert Louis Blickle | Ironton, Ohio |
| B.Sc., Ohio State university, 1937 | |
| Robert James Norton | Fitchburg, Mass. |
| B.S.E., Fitchburg State Teachers college, 1937 | |

IN ZOOLOGY:

- | | |
|-----------------------------|--------------------|
| Wilfred Joseph Sheehan | New Britain, Conn. |
| B.S., Trinity college, 1931 | |

MASTER OF MECHANICAL ENGINEERING

- | | |
|--|----------------------|
| Gardner Ladd | East Kingston, N. H. |
| B.S., Rhode Island State college, 1938 | |

